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THE AMERICAN FARM ECONOMIC ASSOCIATION
Volume XXXVI DECEMBER, 1954 Number 5

THE AMERICAN
FARM ECONOMIC ASSOCIATION

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December 1954

CONTENTS

Address of Welcome ..... *Lyman E. Jackson* 737

How Competitive is Our Economy?

Agriculture and Competitive Structure ..... *J. K. Galbraith* 743

Discussion ..... *L. J. Norton* 747

Is Competition Decreasing in Our Economy? ..... *G. Warren Nutter* 751

Discussion ..... *Walter W. Wilcox* 758

Agricultural Price Policy

Fundamental Issues that Must be Faced in Agricultural Price Programs ..... *Calvin B. Hoover* 760

Discussion ..... *C. E. Brandow* 771

Discussion ..... *W. E. Christian, Jr.* 774

The Instability of Farm Prices Reconsidered ..... *T. W. Schultz* 777

Discussion ..... *Harlow W. Halvorson* 786

Discussion ..... *George Montgomery* 788

Long-Term Price Outlook and Agriculture

The Long-Term Price Outlook and Its Impact on American Agriculture ..... *Nathan Koffsky* 790

Discussion from the Standpoint of Farm Suppliers .. *Sherman E. Johnson* 799

Discussion of the Demand Side ..... *L. L. Boger* 801

Improving Agricultural Economics in the Decade Ahead

Mistakes and Lessons in Agricultural Economics in the Last 25 Years ..... *O. C. Stine* 806

Agricultural Economics in the Decade Ahead ..... *Willard W. Cochrane* 817

Improving Agricultural Economics Research

Major Opportunities for Improving Agricultural Economics Research in the Decade Ahead ..... *Glenn L. Johnson* 829

The Integration of Economic Research and Problems Encountered ..... *Harry C. Trelogan* 841

Discussion ..... *Earl R. Swanson* 850

Use of Mathematics and Econometrics in our Research Work ..... *Clifford Hildreth* 852

Discussion ..... *Richard J. Foote* 858

Improving Agricultural Economics Teaching

Some Observations on Teaching ..... *Herrell Degraff* 861

Some Guideposts in Teaching Economics to Beginners .... *Virgil R. Wertz* 867

Discussion ..... *W. D. Buddemeier* 874

Improved Teaching Techniques ..... *W. L. Gibson, Jr.* 877

Discussion ..... *John G. McNeely* 882

Improving Agricultural Economics Extension

Improving Agricultural Economics Extension in the Decade Ahead ..... *C. B. Ratchford* 884

Developing a Set of Basic Principles for Economic Extension ..... *J. Carroll Bottum* 894

Discussion ..... *Raymond Beneke* 901

How Extension People Can Use "Recent" Economic Principles Including Marginal Concepts ..... *Richard G. Ford* 904
Discussion ..... *L. F. Miller* 914
Agricultural Economists Working With Industry
How Should the Industrial Economist Operate for the Best Long-Time Results? ..... *Henry B. Arthur* 916
Needed Training and Opportunities for the Industrial Economist *R. J. Eggert* 921
Discussion ..... *Lowell S. Hardin* 926
Problems of the Economist Working With Organizations *Lloyd C. Halvorson* 928
Discussion ..... *H. H. Erdmann* 941
Foreign Trade
Use of Economic Models in Appraising Foreign Trade Policies *Karl A. Fox* 944
Discussion ..... *Cecil N. Smith* 958
Considerations in Evaluating the Effects of Foreign Aid Programs on Trade in Farm Products ..... *Lawrence Witt* 961
Discussion ..... *E. A. Perregaux* 971
Current and Prospective Foreign Trade Situation With Respect to Farm Products ..... *Gustave Burmeister* 973
Discussion ..... *W. G. Murray* 990
Farm Management I
Farm Cost Structure and Opportunities for Cost Reduction ..... *Kenneth L. Bachman and Glen T. Barton* 991
Discussion ..... *Roger C. Woodworth* 1000
Impact of Higher Expense Ratios to Agriculture ..... *Claude Hummel* 1002
Discussion ..... *Thomas E. Tramel* 1008
Critical Problems of Young Families in Getting Established in Farming ..... *Lawrence A. Bradford* 1011
Discussion ..... *F. J. Reiss* 1021
Farm Management II
Problems and Possible Solutions in Determining Input-Output Relationships in Agricultural Enterprises ..... *John C. Redman* 1024
Discussion ..... *S. W. Warren* 1033
Simplified Presentation and Logical Aspects of Linear Programming Technique ..... *Earl O. Heady* 1035
Discussion ..... *James S. Plaxico* 1048
Marketing
Needed Developments in Economic Theory for Use in Marketing ..... *Robert L. Clodius* 1051
Discussion ..... *Adlowe L. Larson* 1058
Lines of Advance in Research in Marketing ..... *John D. Black* 1061
Discussion ..... *William C. Crow* 1068
Progress in Developing a Set of Principles in the Area of Consumer Behavior ..... *Herman M. Southworth* 1071
Discussion ..... *Norman Nybroten* 1081
Marketing Extension
Integration of Programs—A Challenge to Marketing Research and Extension ..... *Lloyd Davis* 1083
Discussion ..... *Tyrus R. Timm* 1091
The Place of Consumer and Retailer Education in Marketing Farm Products ..... *Gale Ueland* 1094
Discussion ..... *Raymond J. Penn* 1104
Buying Milk on a Solids-Not-Fat Basis
Place of Fat and Solids-Not-Fat in Pricing Milk for Manufacturing ..... *Hugh L. Cook* 1107
Discussion ..... *Stewart Johnson* 1118
Place of Fat and Solids-Not-Fat in Pricing Market Milk ..... *C. W. Pierce* 1121
Discussion ..... *Louis F. Herrmann* 1131

Low Income Areas in Agriculture
Size and Distribution of the Income of Farm People in Relation to the Low Income Problem ..... *W. E. Hendrix* 1134
Discussion ..... *Rex F. Daly* 1144
Economic Development and Adjustments in Southeastern Low Income Agriculture ..... *Charles E. Bishop* 1146
Discussion ..... *Vernon W. Ruttan* 1158
Land Economics
The Function of Land Economics in Agricultural Development ..... *Harold G. Halcrow* 1161
Economic Framework for Watershed Development ..... *John F. Timmons* 1170
Institutional Arrangements for Watershed Programs ..... *Stanley W. Voelker and John Muehlbeier* 1184
Discussion ..... *Gladwin E. Young* 1197
Farm Credit
A Re-Examination of the Credit Needs of Agriculture.. *Howard G. Diesslin* 1200
Discussion ..... *Frank Miller* 1212
Current Guides as to Safe Debt Loads for Farmers ..... *Rex R. Bailey* 1216
Discussion ..... *G. A. Pond* 1223
Agricultural Data
Agricultural Data Requirements—National, State, and County ..... *Walter H. Ebling and Henry L. Ahlgren* 1226
Plans for the 1954 Census of Agriculture ..... *Ray Hurley* 1240
Discussion ..... *R. K. Smith* 1247
Discussion ..... *Frank V. Beck* 1251
Graduate Student Section
Generalization Versus Specialization in Graduate Training *Bernard J. Bowlen* 1253
Discussion ..... *Albert N. Halter* 1260
Discussion ..... *Joseph F. Metz, Jr.* 1261
New Horizons in Agricultural Economics ..... *Riley S. Dougan* 1264
Discussion ..... *George L. Capel* 1271
Discussion ..... *C. P. Schumaier* 1274
Summaries of Award Winning Theses
Economic Efficiency in California Pear-Packing Plants *Benjamin C. French* 1276
A Study of the Nature and Cost of Government Programs Affecting Potatoes and Their Impact on Inter-Market Relationships .... *Vernon L. Sorenson* 1281
Minutes of the Meeting of the Executive Committee of the American Farm Economic Association, Pennsylvania State University, Sunday, August 22, 1954 1285
Minutes of the Annual Business Meeting, Wednesday, August 25, 1954 1287
Report of the President 1288
Report of the Election Tellers 1291
Report of the Secretary-Treasurer 1291
Report of the Auditors 1294
Report of the Editor 1294
Report of Committee to Appraise Awards Program 1296
AFEA Awards Program Report 1297
Minutes of the Executive Committee Meeting, August 25, 1954 1299
Index to Volume XXXVI 1301

JOURNAL
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ADDRESS OF WELCOME

LYMAN E. JACKSON, *Dean*
College of Agriculture
The Pennsylvania State University

IN JUNE of this year, it was my pleasant duty to bring to the American Dairy Scientists, about fifteen hundred of them, gathered in this auditorium, a welcoming address. Now you are here and I am privileged to do the same for you. At the time of the other meeting, I presented a scientific paper on the subject of "Welcome," complete from an hypothesis through to "quod erat demonstrandum" or a Q.E.D. which proved without a doubt that all the delegates were more than welcome at The Pennsylvania State University.

For that occasion, I made numerous inquiries. From President Eisenhower—our President Eisenhower—the Board of Trustees, the Burgess of the Borough of State College, the State Secretary of Agriculture, the University weather man, the Department concerned. I received enthusiastic acclaim to the idea of having the Dairy Scientists here. I even talked to old Mount Nittany and to the Nittany Lion of our Shrine, and found they shared the same sentiments.

Strangely enough, only the cows in our dairy herd raised an objection to the Dairy Scientists. I went out to see old Josie Hangerveld De Kol, the matron of our dairy herd. I explained to her just who was coming and what the Dairy Scientists were noted for. For a moment she seemed pleased, then she bawled, "Throw the rascals out! That's the gang that foisted modern conception on us!"

You can just imagine the time I had to mollify her and all her madams. Believe it or not, I finally succeeded in getting them to "moo" an enthusiastic resolution of welcome, which I spread on the record in my welcoming address to the Dairy Scientists.

Now I am sure you are saying to yourselves, "What has all this welcoming of Dairy Scientists to do with us?"

Well—it is this way. When I went around making those interviews, I

told them not only about the Dairy Scientists, but about all of the Agricultural Economists coming here in August. Just a short while ago, I reviewed with all of them again the fact of your coming, and of course added to the list Dr. John and all the members of his fine department, including their wives. All were delighted with the idea!

And even the cows are happy about your coming, and invite you to visit them in their fine new University home. Josie took me aside and said, "Don't you suppose those Ag Economists could help us? If they would study our situation, and could prove with their statistics that it is economically unprofitable for the Dairy Scientists to continue what they are doing, I am sure it would help us in our struggle to return to the ancient rites, ceremonies, and virtues of normal bovine society."

I told Josie I would lay the case before you.

As a result of all this, I have assembled as neat and as complete a package of Welcome to be delivered to you as anyone could imagine. But it is here that *my* troubles began. Economists are different, you know. How does one penetrate their natural resistance to oral efforts? I know that if I blow a lot of hot air about welcome on a crowd of cold economists, that it will just blow up a squall the like of any thunderstorm on record.

Just what are "Economists"? I could find many books on Economics, but nothing that really described an economist. They had been missed and I presume that is why they are called "econo*mists*."

Then a happy thought struck me. You know at one time I was touched by Economics. That was at the University of Wisconsin, back in the days of Bennie Hibbard, Richard T. Ely, George Wehrwein, Eric Englund, and Wild Bill Kiekhofer. Bushrod Allin was a classmate of mine. He got caught. I escaped.

As I was about to explain—out of this background came the happy thought that I might make my bundle of welcome more palatable if I could present it as an economic commodity. "Let me try," I said to myself. "If my welcome is an economic commodity, then it must have time, place, form, and possession utility."

"Eureka!" My bundle of welcome as a commodity, has time utility. It says so on the program, for this is the *time* for it. And this is the *place*—so it has that utility as well. As to "form utility," well, there I began to slow down. There might be some question. However, when I came to "possession" utility, I reached the whole crux of my problem. Suddenly, I realized that my commodity would be of little utility unless the assembled economists wanted it, have the wherewithal to get it, and could use it after they had it.

Then I had a mental break-through. It dawned upon me that my problem was a matter of trying to mix two, often mutually exclusive, disciplines,

economics and *psychology*. You see, I was touched by psychology, too, back there at Wisconsin.

Yes, a welcome is largely an affair of the emotions and the heart and thus is in the field of psychology. On the other hand, economics is an affair of the head and the mind, having to do with man's physical needs and wants.

Now I know you would think it a tremendous achievement on my part if I were to solve this problem by myself. If I were to do it with a committee, however, I know your admiration would be boundless, so I chose the latter course.

I will guard with my life the identity of those helping me. (Where have you heard that philosophy expressed recently?) In the interests of objectivity, I have kept economists off of the committee. While keeping the names strictly *incognito*, I think you should know the fields represented. Our servants on this committee were an optimist, a psychiatrist, and a rural sociologist. I think the need for the first two is obvious, but as to the sociologist—Well, we needed someone who knew a little at least of the customary statistical jargon used by economists.

And so we began our evaluation of economists. The very first thing our rural sociologist said was, "I think we should make a study of the nature of the population with which we are confronted."

Good old rural sociologist! I knew he would come up with something. Of course, there arose the question of what it was about our population of economists that needed investigating.

At this point, I reached into my superior background of economic lore and came up with this: "Ever since the days of Malthus and Ricardo," I said, "economists have been known as the prophets of gloom. They are known as the gloomy scientists. Furthermore, I think they get that way from always hunting for and looking at—averages."

We turned to the optimist of our team for his analysis. "In all our studies, experiments, and investigations," he said, "we never have found an optomistic economist. They are all alike, a bunch of gloom."

Our rural sociologist took exception to the concept that all economists were alike in their gloom. He said, "If we may assume that economists are human, then in any reliably sized sample of the population, such as you are dealing with here, the whole business is a continuum which will be found to follow the normal curve of distribution."

"Brother, would you please explain that in plain English?" asked the Optimist.

"It's this way," explained our Sociologist. "When the Dean gives his address of welcome, there will be someone in his audience who will be the least gloomy, and someone who will be the most gloomy. The rest will

range in between. At the least gloomy end will be what you might call the gleefully gloomy ones, while in the middle, and the greatest number, will be the 'mean' gloomy economists."

"Do you mean cussed mean gloomy economists?" interrupted our psychiatrist.

"Oh, no," I said, "in the language of an economist, the word 'mean' doesn't mean *mean*, it means *average*."

"I see," said our Optimist, "an average is what hens lay eggs on, isn't it?"

"Yes," I said wearily, "I guess that is as good an explanation as any."

"Then," continued our Sociologist, "there are a few economists that are about three and a half standard deviations below the mean in gloominess. These are the glum gloomy economists. They can try out a static to the point where there isn't even a crackling left."

"Now it seems to me," said I to our committee, "all this talk about gloom merely points out the fact of how tough it is to make economists really feel welcome. How I wish I could look on the inside of an economist and find the real solution to our problem."

This brought our Psychiatrist to life.

"I can be of assistance at this point," he said. "We have a very confused Economist over in our clinic right now."

"I suppose," said the Optimist, "that you are getting many Agricultural Economist patients confused over the rigid versus the flexible price supports."

"No," answered the Psychiatrist, "the ones we find confused on that point are not the economists but the politicians."

I interrupted here and said, "All this doesn't help much either. I thought all you psychiatrists did was to couch and talk your patients out of trouble What I want to do is really look on the inside."

"Oh," said the Psychiatrist, "when we get a patient as confused as our economist, lying and talking doesn't help much. We have to operate. We are going to do a pre-frontal lobotomy on him."

"You are going to do what?" I shouted.

"Yes," he said thoughtfully. "We are going to open up both sides of his head, reach in and unhook the front part of his brain from the back end. When this is done," he explained, "you can re-hitch the individual so that he will go one way at a time instead of both ways at once as he is doing now."

The next scene took place at the side of the confused economist in the clinic. I know you will never believe what we saw when we looked inside. The first thing that popped into view was a blonde. That about threw us for a loss. What could a blonde be doing in the mind of an Economist? We were just about ready to punt when a rare flash out of that great

insight I have in the field of Economics brought the answer to me. So I explained it to the committee. Now I am not telling you for a little while what it means for an economist to have a blonde in mind; I want you to struggle with it as I did.

Next we viewed a great parade of charts, graphs, means, medians, modes, correlations, regression equations, and at one point we even saw a coefficient of alienation with a probable error attached. There was one float representing labor and one capital. On both sides and as a part of the parade, it seemed, was a wildly gesticulating line of gypsy-like characters, all shouting and displaying banners. Each banner read, "This economist unfair to variants. We haven't been analyzed for months." Our Psychiatrist believes these were the chief infestants causing confusion in the poor economist.

And who do you suppose was in there watching the parade from the doorway of a little house? None other than Karl Marx. On closer inspection we realized that Karl was living in a dog house. We concluded our frustrated friend couldn't be entirely confused if he kept Marx in the dog house. Our Optimist observed that old Karl didn't look too well. He said that he had a very bad case of Russian croup, for he had a terrible Malen-kov. Isn't it awful for Optimists to be as corny as that.

And now back to the blonde. There was one thing about her that was very revealing, and that was her temperament. It was most significant to me that she was the very antithesis of the vivacious type. She was indolent, languid, relaxed and of the lolling bathing beach blonde type, a sort of sand witch, as you doubtless know. I pointed this out to the committee.

"Boys," I said, "this blonde business means that our confused economist is definitely not a mercantilist but is a firm believer in letting nature take its course, and therefore he is a physiocrat."

"But what has an indolent blonde got to do with the patient being a physiocrat?" asked the Optimist.

"That, my friend," said I, "gives us the real clue. You see, he likes the *laissez-faire* approach."

Again it seemed to me that we were at a standstill in learning how to really welcome Economists. My growing gloom was abruptly dispelled when our Psychiatrist exclaimed, "I've got it! I know how you can put over this welcome."

"How?" I asked excitedly.

"Don't you see down there at the base of the brain, this Economist has a hypothalamus and that means that each one of your visiting economists will have one too!"

"What's a hypothalamus?" I asked in consternation.

"The hypothalamus," he explained, "is the crossroads between your

mind and your heart. It is a sort of a nervous switchyard through which everything must pass. If you could pour your welcome on the respective hypothalami in your audience, your mission would be accomplished."

During all this commotion, our Sociologist kept interrupting with points of order. He kept insisting we were drawing too many conclusions from just one case. We decided to disregard him.

Then all of a sudden, the great answer came to my mind. I had heard about the fact that if you gave people radio-active iodine that it would gather in their thyroids. By analogy, I concluded that if I could have my welcome material transmuted into atomic, radio-active, isotopic welcome dust, that all would be well. With the help of the university physicists and engineers this was done.

As I stepped to this podium, unknown to you, I punched an electric switch which put a big blower into action. That probably has been amply demonstrated. Since then, you have been in a fog of isotopic radio-active welcome dust. I am certain that our isotopic welcome has had time to reach your hypothalami, your minds, and most of all your hearts. By now you know that we of The Pennsylvania State University are happy to have you with us and we hope you are as glad to be here as we are to have you here.

I am sure you realize also that the reading of this paper with all its extraneous material was a purely diversionary tactic. It was timed to permit our welcome to reach its most effective peak.

Thus I come to the end all good economists attain. I have reached the point where any added increments to this tale would bring proportionately decreasing results. I feel a shroud enveloping me. It is the old economic law of diminishing returns setting in.

Thank you for your patience and your indulgence.

HOW COMPETITIVE IS OUR ECONOMY?

Chairman: G. W. Hedlund, Cornell University

AGRICULTURE AND COMPETITIVE STRUCTURE

J. K. Galbraith
Harvard University

I AM happy for the opportunity to talk on the effect of comparative competitive structure on agriculture. For one thing, the question is important. For another, I have the feeling that some of my views on the subject have been misconstrued in some measure. Let me hasten to add that I do not assume that the responsibility for such misconceptions lies exclusively with my audience. I am not, at this moment, impressed by the simple clarity with which I have always handled this problem in the past.

So, even at the risk of stressing the obvious, let me see if I can be clear on this occasion. I should like first to deal with competitive effects which seem to me to be reasonably beyond dispute. I should like then to go on to some which are debatable. This distinction is important, for in making it we find that the area of what may perhaps be called inescapable agreement is a good deal larger and more significant than appears at first glance. However, there is also an important area where we cannot generalize.

Areas of Agreement

There must be agreement that agriculture, apart from specialty crops, the co-ops, the milksheds, and abstracting for the moment from public controls, conforms to the economists' limiting case of pure competition. If the test for the latter be the elasticity of the sales curve of the individual firm, that test is satisfied in the market situation of the great range of staple agricultural production.

We must also agree, at a minimum, that the rest of the economy conforms less closely to pure competition. Among the economists of our time are some, perhaps, whose affection for competition leads them to insist that because it is so good it must exist, whatever the evidence to the contrary. This approach shows a commendable loyalty to an old friend; it does not reflect, perhaps, the very best in scientific method. It involves a strong and, indeed, an automatic resistance to any suggestion that oligopoly is ubiquitous in non-agricultural enterprise. But even those who say, paraphrasing a former Secretary of State, that they will not turn their back on Adam Smith must agree that such oligopoly as there is in the economy is in the non-agricultural sector. Pressed, some at least may agree that mutual interdependence in price-making and product-competition are fairly com-

monplace in non-agricultural enterprise. For that reason, the horizontal sales curve of the conventional geometry of pure competition is less than universal outside of agriculture.

This, surely, is a modest statement of the area of agreement. And yet, the implications are considerable and our tendency to depreciate the commonplace may have caused us to neglect them. Thus we know that where there is no recognition of interdependence—where the demand curve of the individual firm is completely elastic—the intelligence of a shift in demand is necessarily made known to the firm by way of a change in price. Where there is interdependence the firm, by definition, has a measure of jurisdiction over its prices. The same intelligence appears in the form of an increase or a decline in orders. In the absence of a decision to change prices, it reflects itself further in an increase or a decrease in production.

In an economy *which is susceptible to large shifts in demand*, these are facts of first importance. Agriculture responds in the first instance with price changes; the rest of the economy *tends at least in part* to respond with production changes. The most pregnant of past causes of shifts in demand is reduction in aggregate income and output—in short, a depression. This analysis means that there is an unequivocal tendency in depression for prices of agricultural products to decline more precipitately than those of non-farm products. The empirical evidence on this is, happily, as definite as the analysis which underlies it. There is an organic difference in the behavior of the price structure as between agricultural and non-agricultural enterprise, and this is inherent even in the most conservative view of differences in competitive structure.

So much, as I say, must be accepted, or at least it can only be denied by a truly heroic rejection of both logic and coincidence. But oddly enough, what would seem to be the practical consequences are not accepted. One consequence would seem to be a special—I do not say favorable—view of arrangements which keep the terms of trade from turning against the farmer in times of declining demand. The price system does not treat all entrepreneurs alike. With declining demand, agricultural prices and entrepreneurial return suffer first. Factor employment suffers first in industry. As the entrepreneur who is singled out for special treatment, it is hardly remarkable that the farmer should contemplate measures which neutralize this treatment. Yet there would seem to be little doubt that a large body of opinion in our profession continues to regard such a reaction as distinctly abnormal—as a claim for special privilege. I have already remarked on this in the case of the able and distinguished authors of *Turning the Searchlight on Farm Policy*.[1]

[1] "Economic Preconceptions and the Farm Policy," *American Economic Review*, March 1954, pp. 40-52.

The causes of this discontinuity between what would be accepted in the analysis and what is concluded as to its consequence would seem to be two. In part, it follows from the habit of abstracting, for purposes of price and particular-equilibrium analysis, from the problem of depressions. There is an implicit full-employment assumption—even though explicit allowance for depression is made. This is the habit of so generally impeccable a theorist as Professor Schultz. (One finds it running deeply through Professor Schultz's last book.[2] It is one reason that nature, not the business cycle, is at the center of his stage.) He argues the case for uninhibited resource allocation by relative prices and against artificial restraints that do more than correct the vagaries of market price in reaching equilibrium under conditions of full employment. Given the threat of depression he would agree—although the decisive word on the matter is his—that the farmer has a moral case and the economy a strong fiscal interest in measures that at some point arrest deterioration in the farmer's terms of trade. But Professor Schultz can only be forced into the world of such gross demand shifts and of possible depression with difficulty. It is an exceptional and abnormal world. This is unfortunate. Were he to inhabit it regularly, he would have the rewarding experience of meeting a lot of farmers. And, as compared with their world of free relative prices and full employment equilibrium, he would find that what is lost in beauty and symmetry is compensated for in reality.

It is plain, however, that not all who avoid the differential effects of demand changes in face of differing competitive structure do so by assuming away the really significant movements in demand that are associated with the business cycle. In part we have a simple, straight-forward preference for traditional economic arrangements. This is a highly defensible preference. It cannot be defended, however, by assuming that the free price system treats farm and non-farm entrepreneurs alike under conditions of gross changes in demand. The defense, if one is entered, must be that, while the impact of the price system on the farmer is different, this difference does not justify government interference. Or perhaps the unfavorable terms of trade of depression are compensated for by the favorable ones of high demand. The behavior of the terms of trade cannot be denied.

Areas where Conclusions are Tentative

I am not particularly concerned here with whether the effect of differences in competitive structure, and its consequences under conditions of changing demand, justify intervention on behalf of the farmer. I am per-

[2] *The Economic Organization of Agriculture.* New York: McGraw-Hill, 1953.

suaded that it goes far to explain the ancient interest of the farmer in inflation as a way of protecting and improving his terms of trade and that equally it explains his modern interest in support prices and the associated programs and measures. I have talked in the past about the relative weakness of the farmer's bargaining position and the consequent incentive to try to develop what I have elsewhere called countervailing power.[3] This is the context which I have had in mind.

We can think of the foregoing as the dynamic aspect of the problem. There is also a static aspect of the problem where, on the whole, there has been more dogmatic assertion but where, in fact, the evidence is less clear. Let me put the matter in the form of a question. Differences in competitive structure turn the terms of trade against the farmer in times of falling demand. Do these differences—the fact that, sometimes at least, he is juxtaposed to monopoly or oligopoly in the markets in which he deals while his own position approaches pure competition—also mean that his situation is intrinsically unfavorable? Is the equilibrium situation one in which he is subject to a measure of monopolistic exploitation?

Of this we cannot be sure. In contrast with the dynamic or terms of trade effect, the analytical result is uncertain and the empirical evidence is, to say the least, unclear. As Professor Nicholls, to whom we are all indebted for work on the problem, has suggested, the conclusions have a way of being settled when the assumptions are selected.[4] We know that a monopolist or oligopolist who buys, processes, and sells farm products may extract a monopolist's return. Furthermore, there is no doubt that the incidence of this in the short-run may be partly on the farmer. And we know, of course, that the incidence of imperfect competition or monopolgy power is higher among those who do business with the farmer than it is —ex-government programs—within agriculture itself.

This is about all we can say for sure, although a great deal more is usually said. In the longer-run we commonly assume that any underpaying of factors as the result of monopolistic exploitation will lead to their withdrawal (or revaluation) and, thus, to a revision of the incidence of the monopoly gains. But we also know enough of the immobility of factors in agriculture to realize that this may be another of the long-runs in which people are all dead.

This aspect of the problem also raises in a much more acute form the question of the extent and depth of monopoly power. A relatively mild

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[3] *American Capitalism: The Concept of Countervailing Power.* Boston: Houghton-Mifflin, 1952.

[4] W. H. Nicholls, *A Theoretical Analysis of Imperfect Competition with Special Application to the Agricultural Industries,* Ames, Iowa: Iowa State College Press, 1941.

degree of market power appears to confer power to influence prices or, perhaps more accurately, to maintain the oligopolistic convention against price-cutting or unmanaged movements in prices. To maximize prices by an exploitative price policy, either on the buying or on the selling side, may well require a good deal firmer monopoly position. It follows that the degree of monopoly which adversely and severely alters the terms of trade problem, when demand shifts to the left, may be of little consequence as regards monopolistic exploitation.

Still, it would be unfortunate were the possibility of such monopolistic aggression removed from our thinking. The classic case, again excluding government programs, of agricultural pure competition juxtaposed to oligopoly, is the tobacco industry. Entrepreneurial incomes of tobacco manufacturers have long been exceedingly favorable. It would be a bold man who would argue that none of this was at cost to the unorganized and, in market power, infinitely weaker growers. It is interesting, at least, that the growers never thought so. Dissatisfaction with their market power vis-a-vis the big companies was endemic until, with the assistance of the government, they obtained a countering monopoly power of their own. Then a great peace descended on the tobacco belt.

Similarly, it would be hard to argue that mid-western farmers were never the victims of the monopoly power of the railroads—or of commission firms or packers. And it would be equally dangerous to argue that because this exploitation once existed its pattern remains unchanged. The lesson is that we cannot be certain. At this stage it is one of the sacred rituals of our profession to call for more research. Unfortunately, this is also a problem which research will never solve. The parameters are too numerous.

The lesson, on this static aspect, I think, is to know what we do not know. This will bring us relief from the appalling certainty with which it is often asserted that the farmer is the victim of the monopolistic aggression of a highly cartelized society. And it will also win us surcease from the equally dogmatic contention that this sort of thing can't possibly happen and that wisdom and restraint—and scientific method—are all on the side of those who say no. It will leave us free to react to the evidence as we encounter it.

DISCUSSION

L. J. NORTON
University of Illinois

I agree that individual farmers behave more like textbook competitors than do most nonagricultural firms and that when demand declines, prices of agricultural products decline more than do prices of products of industries in which

firms find it feasible to control supply. But I should like to point out that we know little about the prices of many such industries at retail levels. The published indexes all exaggerate stability. What has the real retail price of automobiles or farm machinery been during the last 18 months? Certainly below the list price.

But the discussion in recent years concerning farm supports has not turned on the relative effect of depression on farm and nonfarm prices. For 14 years we have not had to deal with depression. In *Turning the Searchlight on Farm Policy,* in the preparation of which I am proud to have played a part, we went to some length in spelling out why we did not expect a severe agricultural depression. Perhaps we were in error. But the recommendations must be considered in the light of this expectation. In case of severe depression, we proposed the same course of action as a committee of this association did back in 1946.

Rather recent discussions on price supports have turned on the consequences of the more or less arbitrarily selected (by Congressional action) standards for price support and the effects which the use of such standards have had on the allocative functions of prices. These programs finally led to drawing excess resources (or retaining them) into a few limited lines of agricultural production, the slowing of use or sales of these products and the piling up of unwieldy stocks which now burden their markets. These effects are greater for commodities where demands have declined: in butter where large numbers of consumers had shifted to an effective substitute; in cotton and wheat where the export demand turned down sharply following July 1952. But the cause of these difficulties was not depression—either at home or abroad.

The basic problem in American agriculture today is that of adjusting our over-all output away from a few items to which excessive resources have been committed towards products for which consumers' demands are not saturated. In a broad way this means more animal products except butter. Dr. Walter Wilcox spells this out in the August issue of the JOURNAL. On the operational level the question is: Can this job better be done within the framework of high rigid price supports for cotton and wheat or within the framework of a freer system. Congress has resolved this by a modest—very modest—step toward a freer system.

Our basic crop in the USA is corn—grown on 80 million acres. And our second most basic crop is hay—grown on slightly less. If rotated pasture were included, the hay crop would rank above corn. Now in the Corn Belt farmers did not take price supports too seriously until they required cutting their individual acreage in corn. Only once since 1942 had there been corn allotments. This was in 1950 and compliance with allotments was not high. Many farmers have used the loans for the cost was low. Apparently in 1954 a large majority of the farmers in the Corn Belt felt that the costs of compliance were too high and so dropped out of the program. They were well aware that the major effect of the 1954 reduction program was to stimulate the production of feed crops other than corn. They asked: Why cut down on the best feed crop in favor of less desirable substitute crops? Parenthetically, this propensity to plant all land to some crops is so strong in all areas of the USA that the new gadget "cross compliance" will likely have little real effect. Farmers will avoid overplanting "penalty crops," but many will give up price support loans rather than curtail the growing of other field crops. This attitude of corn-belt farmers had much

to do with the recent doings in Congress which seem to have surprised so many people. The cost of "price supports" to the individual farmer as he appraised these costs simply became too high over a broad section of the USA.

Galbraith's second point is that most firms outside of agriculture have power to influence prices. I readily agree that most such firms are in a much better position to control supply or, in case of buyers, to control purchases than are farmers. But that this causes prices of farm products to deviate very far from their economic value represented by the general conditions of output, supply, use, and demand, I very much doubt. In the supplier industries, monopolistic influences are probably greater. Here the rigidities are exaggerated in published price data. Large scale farm-supply cooperatives can get the established margins on petroleum products, but not for fertilizers. There are a lot of simple facts that we need to know in this whole area. More search for facts and less dependence on textbook models is desirable.

Turning back to monopoly influences on farmers' prices, the first point to note is that all elements in the trade are middlemen. The only price that basically concerns them is the price of their particular services. Mostly this is a trading margin, i.e., the difference between buying and selling prices either for raw materials or for some combination of products derived from these raw materials. They are interested both in size and stability of this margin. To the extent that this margin is larger than it would be under strict competition, producers' prices are lowered or consumers' prices raised. But the size of this margin is the over-all measure of such influence. For many types of firms the margin is narrow, so the possible influence is small.

In general, an industry handling perishable raw products cannot control its volume. The livestock slaughter industry must process all available raw product. If one firm will not, another will. Most firms do not want to lose position and so must conform operations to the pattern of supplies. The same is true of dairy products and in general, though not quite so completely, of horticultural products. Processors of less perishable products—cotton, wool, grains—may adjust operations to volume of sales. But again, none of them is likely to turn down business which will cause it to lose its position in the industry. So processors and handlers of most farm products do not have the degree of control over supply assumed in the monopoly models.

It is common knowledge that margins in the cotton textile and meat industries are quite variable.

In all studies of profits of food industry firms, volume of business is a vital factor in costs and earnings; this tends to force all firms to operate as close to capacity as is practicable.

In some industries price-making institutions, such as futures markets, may operate to crowd raw product prices upward and to take complete control over margins away from processors. There are few firms in the soybean-processing industry which would not argue this to be the case. Firms turn to unorthodox (according to textbooks) ways of operation to earn desired margins. More than one firm in the industry operated profitably in 1953-54, when apparent processing margins were below what the United States Department of Agriculture says is a break-even point, by shrewdly taking positions in undiscounted situations in the soybean market or, in plain English, by successful speculation. If this conforms to the textbook models of monopoly, I do not understand them.

We need a lot more research—not as to conformance or nonconformance of firms to textbook curves but as to actual behavior and success or failure in actually realizing margins in the food-processing and handling industries.

That tendencies to monopoly exist, I will agree. But that the cards are stacked against the farmer because he does not have such power, I do not agree —certainly not to the extent that some prominent agricultural economists assert so boldly. Professor Galbraith's position of course, is by no means as positive as that of some of our colleagues.

I am intrigued by his comment on the peace that has descended on the tobacco industry. One of the South's leading farm economists told me: "Tobacco in our state is a dead industry." Responsible people in administrative and congressional circles seem satisfied to put the epitaph "R.I.P." on its tombstone. But what is the significance of this governmentally-managed cartel to the rest of agriculture. We plant about 1.6 million acres in tobacco. All the fragments of land taken out of tobacco are presumably planted to other crops. We plant 50 times as much land to corn. Even North Carolina—our largest tobacco state —has about three acres in corn for one of tobacco. There is not time to spell out the differences, but the tobacco growers' monopoly has very little to offer in guiding the important agricultural industries which utilize the major part of our land.

IS COMPETITION DECREASING IN OUR ECONOMY?

G. Warren Nutter
Yale University

IT IS always useful in a paper of this nature to settle as quickly as possible what is going to be talked about. It would take little ingenuity on my part to turn the assigned topic into a springboard for virtually any theme I might want to expound, since the notion of competition has come to mean so many things. If we may judge from recent literature, this seems indeed to be a case where it is quite legitimate to make a word "mean just what I choose it to mean—neither more nor less."

I choose competition to mean what it used to mean in economics: a configuration of forces in a market economy that causes goods to be priced, in the "normal" run of events, at their costs of production, at least in the marginal sense. There are many possible configurations that can lead to competition, the only requisite being that they must operate within a market framework where economic choices are made by individuals, each acting either by himself or in voluntary association with others. Competition performs its work by making it impossible for a seller to gain anything by varying the price he charges: when he acts in his own pecuniary interests, he is forced to accept the price set by market forces.

One of the unfortunate things in the development of economic theory has been the tendency to prescribe a very rigid set of conditions that must be met if the demand facing a seller is to be completely elastic. These conditions are familiar to us all: the product must be homogeneous, the sellers must be many (to the purist, infinite in number), and every seller must be an unyielding economic man. If these conditions were taken literally, they would have no application at all in the world we live in, for we could never even get so far as to find a truly homogeneous product: "nature makes no leap." No two grains of wheat are identical in terms of all physical criteria that might be applied. Homogeneity exists only in the imaginary world of electrons, or perhaps now even farther away in the world of quanta of energy.

The point is, of course, that we do not take the concept of homogeneity literally, and we do not have to in order to find competition in action. This raises the whole question of where we need to draw the line in identifying products, counting sellers, and specifying economic motivation. The answer is that no hard and fast rules can be laid down. In very loose terms, we can say that a seller operates in a competitive regime if his customers have access to a wide continuum of substitute products that are or could be produced by a sizeable number of firms, and if an active minority of his customers and rival sellers are cagey.

This leads us to the obvious point that competition itself is a continuum: there is more or less competition as prices tend more or less toward cost of production. Where we draw the line between competition and "non-competition" must be somewhat arbitrary, just as it is arbitrary where we draw the line between night and day.

Conceptually, it should be easier to know whether competition has increased or decreased than to know how much there is at any time. As a practical matter, however, both jobs are about equally awkward. In an economy characterized by pervasive change, there are all manner of cross-currents and few unchanging landmarks: some developments promote competition, and others impede it; the mixture of developments differs in different sectors of the economy; and the sectors themselves may change so much that all sound bases of comparison seem to disappear. For these reasons, there are some economists who would counsel that the best way to answer the question whether competition is decreasing is to call it a silly question, that is, a question incapable of being answered. But it seems to me that this question is no sillier than many others that are raised and answered in one way or another, such as how fast our economy is growing. We certainly have not hesitated to devise, by bold and ingenious methods, answers to these other "unanswerable" questions, and I see no compelling reason why we should hesitate here, unless the underlying issue is considered to be unimportant, which I take it is not the case.

There are two general ways of attacking our problem. We can investigate the forces tending to affect the degree of competition throughout our economy; and we can investigate whether the regions that pass muster as competitive, on some set of criteria, are tending to occupy more or less of the economy. We want to rely as much as possible on quantitative information, but we must realize in advance that much must be qualitative. Moreover, the final answer to be found to the question at hand will necessarily rely on judgment and opinion more than on numerical quantities.

Factors Changing the Degree of Competition

Changes in the degree of competition depend on a great many things—in fact, in a purist sense, on everything; any selection of the most important involves the danger that significant factors will be overlooked and that factors with diverse effects will be improperly grouped together. We cannot avoid such selection and classification, however, if we are to bring order into our thinking. I find it useful to concentrate on three factors: changes in the scope of markets, in the array of products, and in technology.

As we look back over the last fifty years, one of the most striking developments in our economy has been the revolution in transportation and communication. There is scarcely any sector of the economy that has escaped the impact of this revolution. Markets have been expanded in all dimensions: sellers have gained easier access to buyers, buyers have gained easier access to sellers, knowledge of market conditions has been made more easily available to everyone, and so on. The result has been an intensification of competitive conditions in virtually every sector of the economy. Moreover, there seems to be no end in sight to the improvement in means of communication and transportation. Some significant adverse effects for competition might have come because of the channels opened up for massive advertising, but I cannot believe that these adverse effects come anywhere close to balancing the favorable ones.

The array of products and alternative sources of supply has grown independently of the expansion of market areas. It is difficult to find a single major industry in which there has been a secular increase in concentration of production, calculated on a national basis, over the last fifty years or so. The nearly universal pattern seems to be a decline in the share of output accounted for by the largest firm and by the three, four, or five largest firms taken as a group. In addition, the variety of products in the economy as a whole incessantly grows. Thus every buyer, whether a consumer or a firm, faces a spectrum of substitute products that is becoming increasingly continuous and deals with industries whose firms do not, at worst, seem to diminish in number or to usurp larger shares of output.

The effects of changing technology on competition have already been revealed in large measure, and they will be further revealed later on. It seems justifiable to single this factor out, however, because of the special interest economists have shown in the phenomenon of mass production, and the tendency in some quarters to assume that this development must make for a decline in competition. The two need not go hand in hand, of course, if the expansion of markets grows at least apace with the economies of mass production. I submit that this is precisely what has generally happened in our economy; the exceptions are few and usually temporary. The recent increase in concentration in the automobile industry suggests that this may be an important exception. But where is another? It seems to me that on balance technological change has worked overwhelmingly in favor of competition.

This superficial and sweeping survey of historical forces at work in our economy reveals no tendency for the foundations of competition to weaken. On the contrary, the signs seem to point to increasing vigor of competitive forces throughout the economy. This is not to say that these

forces have been allowed to express themselves unimpaired, but this is a point I cannot go into in this brief paper. I should like to move now to a somewhat more quantitative examination of the trends in competition.

Estimating the Degree of Competition

The question to be explored is whether industries that can be called competitive have tended to account for a decreasing share of total output. As a practical matter, the only feasible method for classifying industries as competitive is on the basis of concentration of output. The shortcomings of this procedure are well known and do not have to be repeated here. It may be noted, however, that the procedure is probably less objectionable when it is used for the purpose of observing changes in the extent of competition than when it is used for the purpose of measuring the extent at any particular time.

Studies have been made of the changing fractions of production accounted for by industries with relatively low concentration of output. In presenting the results here in summary form, I am perhaps violating the precepts of good scholarship, for these results should be surrounded by qualifications and caveats that cannot be detailed here. In fact, the import of those qualifications can be fully grasped only by being familiar with all the steps followed in such a study. I take it, however, that the invitation for me to speak here implies that I am expected to give the results of these studies in abbreviated form. The only way I can discharge my scholarly obligations, therefore, is to suggest that those who are interested should look into the studies themselves for all the necessary qualifications.[1]

Comprehensive data have been compiled by the Census Bureau showing the degree of output concentration in manufacturing in 1935, 1937, and 1947. I have brought together a body of data, much less complete and much less reliable, for the period around the turn of the century. If we count as "monopolistic" all census industries in which the four largest producers accounted for at least half the value of products,[2] we find that such industries as a group accounted for 32 percent of income originating in manufacturing around 1900, for 28 percent in 1937, and for 24 percent

[1] M. A. Adelman, "The Measurement of Industrial Concentration," *Review of Economics and Statistics*, XXXIII, 4 (November 1951), 269-296; S. Fabricant, "Is Monopoly Increasing?" *Journal of Economic History* (Winter 1953), pp. 89-94; G. W. Nutter, *The Extent of Enterprise Monopoly in the United States, 1899-1939* (Chicago: The University of Chicago Press, 1951); G. J. Stigler, *Five Lectures on Economic Problems* (London: Longmans, Green & Co., 1949). The data in the present paper are taken from these sources.

[2] This is an oversimplified description of the criteria used. See the above studies for more detail.

in 1947. In other words, the industries that show up as "competitive" on this criterion of output concentration accounted for 68 percent of income originating in manufacturing in 1900, for 72 percent in 1937, and for 76 percent in 1947. These figures, even with considerable allowance for error, give no indication of a decrease in the extent of competition in manufacturing.

A similar comparison can be made for mining between 1900 and 1937. "Competitive" industries accounted for 60 percent of income originating in 1900 and for 73 percent in 1937. Again, there is no indication of a decrease in competition.

When we move outside these two sectors, we are on extremely shaky ground in making any quantitative estimates. The minimum requirements for data are simply not met, and the best we can do is to make intelligent guesses. If we leave aside for the moment governmental intervention in the market place, it scarcely seems plausible that the extent of competition, defined in any relevant sense, has diminished in agriculture, trade, and services. If pressed for a judgment, I should argue that it has increased in these sectors because of the expansion of market areas. In the field of finance, the extent of competition may have decreased with the growth of the insurance industry, which probably cannot be admitted to the competitive group. In transportation a decision on what has happened depends on how one classifies railroad transportation now as compared with fifty years ago. There is no question that railroads have become increasingly subject to competitive forces and that they have only a small fraction of the monopoly power they possessed thirty, forty, or fifty years ago. I am inclined to believe that, if governmental regulation were largely removed, railroad transportation would now behave in general like a competitive industry. But opinions will differ on this matter.

Everything considered and variations one way or the other in estimates allowed for, there are in my opinion no grounds for concluding that competitive industries now account for a smaller fraction of the income originating in the private sphere of the economy than they did some fifty years ago.[3]

At the same time, the private sphere has been shrinking. The fraction of workers employed in governmental activities has risen from about 4 percent in 1900 to around 12 percent in 1949.[4] Moreover, this does not take account of the growing sector of the economy that falls under close governmental supervision. Because of this shrinkage of the private sphere,

[3] For some specific figures on changes in estimated fractions of national income originating in competitive industries, see my study cited above.

[4] Solomon Fabricant, *The Trend of Governmental Activity in the United States since 1900* (New York: National Bureau of Economic Research, Inc., 1952), p. 14.

it is quite possible that, in the sense we have been discussing, competition is decreasing in the economy as a whole even though it is not decreasing in the private sphere.

Another point needs to be made: industries have been called competitive on the grounds that they will behave competitively if allowed to. As you all know, perhaps too well, there is a significant amount of governmental restriction of competitive behavior in certain sectors of the economy. If this intervention is taken into account, it becames more and more likely that competition is decreasing. But in this case governmental action is the cause, not the result, of less competition, and this is an important distinction to keep in mind.

Arguments Pointing Towards a Decrease in Competition

If I am right in my argument that there is no evidence to show a diminution in either the vigor or extent of competition, how is it possible that so many economists have embraced, at one time or another, the "decline of competition" thesis? There are several plausible explanations.

In the first place, there was the Great Depression. The thirties were a time ripe for acceptance of any simple explanation of what seemed then to be a catastrophe of indefinite duration. A severe distrust of monopoly was then, if not now, deeply ingrained in the minds of the typical economist. If he believed that the Great Depression was the result of forces cumulating over a long period, it was natural for him to look to monopoly, among other things, as the villian of the piece. Superficial evidence pointing to growth of monopoly in a few isolated areas was rather recklessly blown up into a case proving general growth of monopoly and concomitant decline of competition. There is little doubt that the decline of competition thesis reached its peak of acceptance in the late thirties, as anyone can readily see from a rapid survey of the TNEC documents.

Curiously enough, the temper of the times has so completely reversed itself that nowadays one could expect to find emotional support for the thesis arising from the belief that a decline of competition is good, rather than bad, for the economy. This change of viewpoint is perhaps not unconnected with the shift from bad to good times, which has caused us to shift our attention toward problems of economic growth and away from problems of economic efficiency.

A deeper reason for acceptance of the thesis lies in the empirical nearsightedness of economists. Most of the generalizations about monopolistic conditions come from observations in the field of manufacturing and mining, and these observations in turn involve an incredibly small number of industries. It is easy to overlook the fact that manufacturing and

mining, taken together, account for only slightly more than a quarter of our national income; that services and trade, taken together, match them in importance. I doubt that most economists would seriously challenge the statement that competition is, in any relevant sense one might choose, much more extensive in services and trade than it is in manufacturing and mining. This is to say nothing of the differences in conditions among the remaining sectors of the economy.

Economists may also incline toward a belief that competition is decreasing because they see that fundamental changes have been occurring in the organization of business. The most important has probably been the rise to supremacy of the corporate form, which has accompanied a general increase in the average size of firms. Most importantly, the giants seem to get increasingly gigantic, and it becomes more and more difficult to believe that they can behave in the manner called for under competition. Whatever we may think about the matter when we look at it from this point of view, there does not seem to be any evidence that the rise of bigger and bigger business, in absolute terms, has materially affected the structure of markets. The explanation lies in part in the fact that firms have gotten bigger by moving out into new lines of business, and that they have granted virtual autonomy to the various branches in conducting affairs in their own industries. The explanation lies also in the fact that markets have grown along with firms.

Finally, the role of competition may seem to have declined in the world about us because it has declined in the theories we use. The appearance of the theories of monopolistic and imperfect competition marked an abrupt break in the traditions of theorizing. The point was driven home, much too strongly, that absolutely pure competitive behavior is comparatively rare, that the typical behavior involves a subtle mixture of monopolistic and competitive elements. This was certainly not the first time the point had been made by outstanding theorists, but it had never been made before with such analytical elegance and refinement. It is easy to imagine that many economists assumed that the belated appearance of the theories implied the belated appearance of the phenomena they described. This is, of course, far from the truth: there never has been a Golden Age of all-pervasive competition; the notions of monopolistic competition are just as applicable to the "good old days" as they are to the present.

As a closing note, I find it appropriate to read from Marshall, who on this matter, as on so many others, had something wise to say:

". . . though monopoly and free competition are ideally far apart, yet in practice they shade into one another by imperceptible degrees: . . . there is an element of monopoly in nearly all competitive business: and . . . nearly all the monopolies, that are of any practical importance in the present age, hold much

of their power by an uncertain tenure; so that they would lose it ere long, if they ignored the possibilities of competition, direct and indirect.

"This interlacing of monopoly price policy and of competitive price policy has indeed always existed. But it needs more careful study now than formerly: and this for several reasons. The temper of the age is increasingly analytical; while the contrast between the influences of cost of production on competitive and on monopoly values is more complex than it was when the foundations of modern economic science were laid. Again, though the progress of analysis has taken nothing of importance from the foundations which were then laid, it has built much upon them; while the progress of events has brought into prominence many considerations, which might reasonably be neglected for the practical purposes of business at that time, but which the modern student is bound to examine with some care."[5]

[5] Alfred Marshall, *Industry and Trade*, 4th ed. (London: Macmillan and Co., 1923), p. 397.

DISCUSSION

WALTER W. WILCOX
Library of Congress

I find Professor Nutter's paper entirely convincing. It seems to me that as long as we have a highly dynamic economy, one making rapid advances in technology, there must be widespread, perhaps even increasing competition.

I doubt, however, that this meeting was scheduled for the primary purpose of settling this single narrow question. In this connection we should note the changing character of the competition in our economy and consider its implications.

Consider for example the recent steel wage settlement. Steel workers were given wage increases based only in part on economic forces. According to the reliable magazine *Business Week* a dominant factor was the competition of the two labor leaders—McDonald, president of the Steel Workers Union and Walter Reuther, president of the United Auto Workers. An important factor in the settlement was the desire on the part of the steel industry to give McDonald a better "deal" than Reuther had obtained for his auto workers. We are told the steel industry would prefer to see McDonald, rather than Reuther, advance in labor leadership ranks.

A major factor in wage settlements in earlier years often has been the competitive drive of particular labor union leaders themselves to get wage increases for their union members equal to or better than those obtained by rival labor leaders. We may be looking for countervailing power to keep this type of competition within reasonable bounds if reasonably full employment continues for several years.

Consider also the fact that in spite of widespread competition within the economy, members of the steel industry on the settlement of the wage bargain, immediately raised steel prices roughly the equivalent of the increased labor costs. And they did this at a time when the industry was operating at approximately 70 percent of capacity with little improvement expected soon. This is no refutation of Professor Nutter's thesis but it shows that the competition is of a different type than most economists have in mind when they talk about competition.

These are the type of actions economists were concerned about when in the 1930's they decried the decline of competition and the growth of monopoly. Is it possible that because of the changing nature of the competition in industry we have competition but also many of the adverse developments previously associated with the lack of competition?

I am impressed with another development. In the canning pea industry in Wisconsin in recent years there has been a rapid shrinkage in the production of independent canners at the same time that canners of nationally advertised brands have expanded substantially. I do not know whether this is good or bad, but the fact remains that in the manufactured product field competition now largely takes the form of product competition and advertising budgets. Small producers in many fields cannot find a satisfactory market for their product merely by engaging in price competition.

Perhaps it is because I read the *Wall Street Journal* more regularly than I did a decade ago, but a casual reading of the current financial magazines gives one the impression that we are in the midst of a new wave of mergers and consolidations of relatively large independent firms which when it is over will make much of the manufacturing competition a battle of the giants. The widespread product diversification of corporations is giving us a substantially new type of manufacturing community where the key assets of the firm may be their financial assets and management and technical know-how.

I believe we will all agree that the character of the competition is changing continually as a result of technological changes in manufacturing and communications; changes in labor organization and bargaining; new developments in corporation management and trade association practices; and finally because of government regulation and participation in economic activities. Frankly, I think we need many more careful analyses of the effects on our economy of the changing character of competition in our society.

AGRICULTURAL PRICE POLICY

Chairman: J. G. Knapp, Farmer Cooperative Service

FUNDAMENTAL ISSUES THAT MUST BE FACED IN AGRICULTURAL PRICE PROGRAMS

CALVIN B. HOOVER
Duke University

IN SORTING out the issues that are fundamental in considering governmental price programs we have the experience of well over two decades on which to draw. Yet it is extraordinary how much disagreement there is with respect to the conclusions which are to be drawn from this experience and even in stating the fundamental issues involved.

There is a sort of perverse parallelism in some of the conclusions drawn by the critics and defenders of governmental price programs in agriculture. The hostile critics of these programs come close to saying:

1. The price programs have not been effective in limiting agricultural production and raising farm prices.

2. The price programs have been anti-social in their effects through raising the cost of food and restricting supplies available to consumers.

The defenders of governmental agricultural price programs have countered by saying in effect:

1. The price programs *were* effective in raising prices through limiting production of farm products and

2. The price programs have *not* been anti-social in their effects because production of farm products over the whole period increased greatly while the real incomes of consumers likewise increased greatly during the period.[1]

The critics of the price programs do not explain very satisfactorily how supplies could have been limited and prices raised to consumers if the program did indeed fail to curtail farm production. The defenders do not explain much more satisfactorily how the programs could have raised prices to farmers without limiting supplies and raising prices to consumers.

When one turns to the effects of price programs on resource allocation there is a wide spectrum of disagreement as to whether the programs have been the cause of serious mal-allocation of resources between agriculture

[1] Neither critics nor defenders of governmental price programs in agriculture have, of course, stated their cases so simply and crudely as I have done here.

For a statement of the position of the defenders and for a criticism of the logic of the hostile critics, see J. K. Galbraith, "Economic Preconceptions and Farm Policy," *American Economic Review*, March 1953, Vol. XLIV, No. 1, pp. 40-52.

and the other sectors of the economy and/or of mal-allocation of resources within agriculture itself.[2]

The stark fact of the now-existing surpluses of wheat, cotton, dairy products and the like might seem to prove the mal-allocation of resources. But this does not tell us whether the resource mal-allocation is within agriculture or between agriculture and the other sectors of the economy. Neither can we tell from the mere fact of the surpluses whether manpower and other resources used to produce them could have found alternative employment in other sectors of the economy if they had not been used to produce the surpluses.

Conversely, the failure of so-called burdensome surpluses to accumulate in some cases, as in that of tobacco, neither proves that mal-allocation of resources did not occur nor that prices were maintained only at about those which would have existed in the absence of the price programs. Thus, it seems probable that the tobacco programs did result in the transfer of income to farmers having a production base, and that there was a tendency to freeze resources in less efficient employment, in spite of the fact that surpluses recognizable as "unmanageable" have not accumulated. The one generalization which I would make is that after more than two decades of governmental intervention in the agricultural economy, mal-allocation of resources is substantially less than I would have expected.

This disagreement about the results of the farm programs stems in large

[2] Gale Johnson, for example, believes that viewing the period of governmental farm programs as a whole, substantial mal-allocation did not take place because support prices for most of the period were not greatly above theoretically "proper" prices for the inducement of "proper" allocation of resources. He does not believe that income diversion to farmers occurred. He states: ". . . it would appear that at least until mid-1952 the American consumer and tax payer fared reasonably well, the United States farmer may have gained reasonably little, and foreign producers have on the whole been aided by the programs." (It is not easy, however, to see how both American consumers and foreign producers could have been aided by the programs, looked at within the framework of Johnson's analysis.)

Indeed, Johnson argues that consumers received farm products at prices lower than they would have had to pay had quantities actually consumed been produced in the absence of price supports, presumably because of the stabilization of producer's expectations due to price supports. The logical deduction from Johnson's argument would agree with Galbraith's contention that farmers may produce a given quantity of farm products for some lower guaranteed price than for some higher but uncertain average of prices set by the free market through time.

The contention seems reasonable. See Gale Johnson's "Agriculutral Price Policy and International Trade," *Essays in International Finance*, No. 19, June 1954, Princeton University, and his "Competition In Agriculture: Fact or Fiction," *Papers and Proceedings, American Economic Review*, Vol. XLIV, May 1954, No. 2, pp. 107-115.

Galbraith apparently believes that incomes of farmers were increased by governmental price supports but does not believe that substantial mal-allocation of resources occurred. He further believes that resources were employed which in the absence of the farm programs would have remained unemployed or might even not have come into existence, Galbraith, *op. cit.*

part from two sources, the one that we are dealing with a non-homogeneous period of time during which the price programs were intended at some times to decrease production and to raise prices while at other times they were intended to increase production. At still other times the programs were simply in abeyance. Consequently, it is simply not feasible to judge the results of the whole period by the criterion of the purpose which the government had in mind during any one part of the period.

An even greater source of confusion arises from attributing the good times or bad times for the farmer during the period primarily to what the government did or did not do in its agricultural price programs. It seems likely indeed, that farm income during the period was much more affected by governmental policy in deficit financing, by wars and by foreign aid programs, not to mention the factor of weather as illustrated by the droughts of '34 and '36, than by the governmental price programs themselves.[3]

It would not be very useful simply to state a number of fundamental issues without trying to indicate the problems and difficulties inherent in facing them. I well realize that I cannot furnish satisfactory solutions to the fundamental issues but I shall try to do more than simply state them. I shall try to indicate something of the alternative choices which would have to be made if the issues were to be resolved.

Are There to be Government Programs?

The first fundamental issue is whether we are going to have governmental price programs at all. The political realities have indeed, already determined that we will have these programs for some time to come. However, we can at least visualize three different kinds of situations in which we might not have them. The first situation would be the one in which the costs to taxpayers had become so great, surpluses had become so unmanageable and the complexities and difficulties of administration of the accompanying production controls had become so irksome that price supports would finally be abandoned with the feeling that no alternative could be worse. This situation is not likely to develop since to be really intolerable it would likely be accompanied by generally depressed business conditions. Under such circumstances the administration in power is likely to depend more rather than less upon price supports.

The second situation in which we might not have price supports would be one in which increases in population had caught up with the supply of agricultural products to such a degree that price supports would no

[3] I wish to express my general indebtedness to Murray R. Benedict's excellent *Farm Policies of the United States, 1790-1950,* New York, 1953, The Twentieth Century Fund.

longer be demanded. This is indeed a possibility but one which is not likely to affect our problems during the next half a decade or so, with the future after that uncertain.

The third situation is that in which there would be such a dynamic demand[4] for the whole of the potential production of our economy that the movement of resources out of agriculture into other segments of the economy would be at such a rate as to enable the free market to set prices on agricultural commodities at a level high enough so that supports could be dispensed with, without a great political outcry.

The obvious limitation on the meaningfulness of this comment is that this kind of dynamic demand is normally, and possibly inevitably, associated either with inflation or with the repressed inflation which exists when a comprehensive system of price controls to limit inflation is in operation throughout the economy. Yet we can not exclude completely the possibility that within our economic system there can be developed monetary, fiscal and distributive techniques which would enable it to operate more nearly in conformity with the results assumed by Say's Law than it now does.

What Are Objectives of Programs?

We must next ask what governmental price programs are intended to accomplish if we do have them. Here, three well-worn questions must again be asked:

1. Are they intended only to "stabilize" prices through some system of "forward pricing" by governmental guarantee, with the purpose of "ironing out" fluctuations and thereby eliminating speculative gains and losses for farmers, and facilitating thereby more efficient and well planned investment, resulting in lower costs of production in agriculture?

2. Are price supports, on the contrary, intended not so much to "stabilize prices" but instead intended through some concept of "parity" to increase the farmer's share in national income by transfer from other potential recipients?

3. A different sort of question, which overlaps the two stated above, is whether price supports are also counted upon, whether they are intended only as stabilizers or whether they are intended to re-distribute national income, as props to the general level of national income and/or to the general level of prices and in this way counted upon as part of the arsenal of weapons against an economic depression.

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[4] Such a sustained level of demand as might be associated, with an increase in G.N.P. of, say, 6 percent annum which could be counted upon to continue without significant interruption.

If we choose, as has so often been suggested, the first goal of policy, basic issues at once arise:

1. If the goal of policy is simply stabilization through governmentally guaranteed "forward pricing" designed to approximate the normal prices of a free market, with these prices expected to perform the function of resource allocation, how are we to know what these prices should be, since the free market would not actually exist?

Presumably, if this is the type of price program which is chosen, no governmental controls of crop production would be contemplated to accompany them. The guaranteed prices would presumably be such that they would themselves induce the proper allocation of resources within agriculture and between agriculture and other sectors of the economy. These prices would have to be set low enough so that surpluses, unmarketable at these prices, would not arise. But how would anyone know what the proper prices to accomplish this correct allocation of resources would be? One can hardly answer this question by saying that they would be the ones which would exist if the government did not fix prices!

Nor can one logically say that the proper prices would be the same as those which would result if free market prices were averaged over some time period. Under conditions as they exist in our modern complex economy, it is not certain that an approximation of the economists' perfect market would in fact exist simply by the withdrawal of our government from the price program business.[5] Since price elasticity of demand for farm products is as low as it apparently is and the resource allocation response in supply is not precisely predictable, a substantial zone of indeterminancy in prices characterizes farm products.[6] The effect of a governmentally supported price which sets a floor under the supply price may, within an appreciable price range, be to enable an almost undiminished quantity of farm products to move into domestic consumption, at an increased price.[7] Consequently, as far as the domestic market is concerned, those who would have the task of setting proper forward prices to be guaranteed might find a zone of indeterminateness in consumption and resource-use-response to price which would be somewhat baffling, even without the difficulties inherent in allowing for the unpredictable

[5] There are numerous reasons why this is so, including imperfections and impurities in the competitive character of our economy, the possibility of economic depressions, the interference of other governments in international markets and so on.

[6] I have largely relied for my data on price and income elasticities upon Theodore W. Schultz, *The Economic Organization of Agriculture*, McGraw-Hill, New York, 1953. Schultz may well not agree with my interpretations of his conclusions.

[7] This does not apply, of course, to the international market where the price elasticity of demand can hardly be stated in terms analogous to those appropriate to the domestic market.

factor of weather. Unquestionably trial and correction of error would have largely to be relied upon.

The next issue to be faced if we were to try to construct, through governmental forward pricing, a set of synthetic[8] or constructed normal market prices would be this:

If we try to approximate the "normal" international market price, we have to ask ourselves whether there is any longer an international market price mechanism functioning in the old fashioned meaning of the term. It is true that the releasing of commodity markets in the U.K., from governmental hands, the removal of some of the trade restrictions which were the legacy of the war, the easing of the balance of payments situation of most European countries, and the progress made towards the free convertibility of currencies makes this problem somewhat less acute than in recent years, but it is still a major difficulty. If we choose prices as set on the international market as our ideal of normality then we must work out an even more complex problem than when we try simply to set a price which an ideal free domestic market would set.

Indeed, we might well find, after some hypothetical free market prices had been determined and used as the bases for governmental price supports, that the amount of wheat, cotton, and tobacco which would be produced in the absence of production controls would be larger than the international market would absorb without inviting retaliation by the governments of other countries producing these commodities in competition with United States producers. Surplus producing countries might decide to increase their share of the market by undercutting our "constructed normal price" or by negotiating bilateral trade agreements. Importing countries would, no doubt, continue to protect their domestic producers by trade barriers and/or price subsidies. In this rather likely case we might well find that there was no free international market price but rather a series of prices determined in part by the domestic and international economic policies of the various governments and by their particular actions.

If we choose the other horn of the dilemma and say we are going to use the "normal" domestic price as our guide we have not in fact avoided the problem of the international market. In the case of corn-hogs no great

[8] Since I personally would choose the alternative of synthetic normal market prices, supported by governmentally guaranteed forward pricing, over parity prices which are intended to divert income to the farm sector from the other sectors of the economy, I have deliberately temporarily used the adjective "synthetic" to describe these constructed normal market prices. I would not want to give the impression that these so-called "normal market prices" would somehow come into existence through "natural" processes without the exercise of fallible human will and intelligence. The term "constructed normal market price" which I have finally chosen sounds, I hope, less offensive.

difficulty would exist. But for wheat, cotton and tobacco we must either choose the normal international free market price as our guide or at once face the problems of some sort of two price system, unless production could be reduced to the quantities which could be disposed of on the domestic market at the constructed normal prices.

I do not believe for a moment that this consideration vitiates the arguments for some sort of forward pricing by government, intended to establish some sort of constructed normal market price system for farm products. If this alternative is chosen, however, it should not be selected in the belief that it would be beautifully simple to administer and would automatically afford all the advantage of the economists' model of the free competitive market.

Indeed, the question of how existing farm surpluses are to be disposed of on the international market is only the most acute phase of a really fundamental issue. If we cannot sell our farm products abroad simply for whatever they will bring, without touching off retaliatory price wars and other defensive measures, what is the alternative? Give-away programs are as likely to arouse just as bitter antagonism among our competitors, be they farmers in surplus-producing exporting countries or in deficit, importing countries. Even a country like India is not likely to be willing to depend upon our willingness to give away surpluses as a dependable source of food supply. The natural expectation by the U.S. public that the recipients of our give-aways will be grateful, under circumstances where irritation instead of gratitude is the probable result, is another telling argument against this form of surplus removal.

The alternative might be some form of international agreement, perhaps along the lines of the International Wheat Agreement, complicated and difficult of administration as that agreement has proved, to supplement other international market mechanisms. This would probably be essential in the case of either of the two forms of governmental price programs. However, since the differential between the domestic and the international price would presumably be less in the case of constructed normal market prices than in the case of a parity-price, income-re-distribution type of governmental price program, the problem of implementation of a two price system would be less difficult in the first instance than in the second.

Can The Programs Work?

If we choose the second purpose as the policy goal of governmental price programs we must first ask whether prices which are set by governmental action at higher rates than would exist under the free market can in fact provide higher real incomes to farmers, in the absence of additional subsidies to farmers paid by government. Within the customary frame-

work of economists' thinking the answer would be clearly in the negative unless production controls or surplus disposal programs accompanied the price programs. The pure and perfectly competitive market price by definition would be the price which cleared the market and any price above that would find a greater quantity offered than would be taken off the market.

Indeed, it has been argued that farmers would not be benefited by setting prices above those which would exist in the free market since the falling off of consumption which would follow would prevent any appreciable increase in total farm income. What farmers gained by higher price per unit sold would be lost through diminution in consumption.

It has been pointed out previously, however, that on account of the relatively low price elasticity of both demand and supply of farm products there is probably a zone of indeterminancy within which governmental price programs even without production controls could raise domestic prices temporarily above what they otherwise would be in the absence of price supports. However, this zone of indeterminancy to the extent that it depends upon low price elasticity of supply, even if the domestic market could be isolated from the international market, would not be permanent. Given time to increase investment imputs, such increases in price could not be maintained unless increases in supply could be prevented through controls or through diversion to other markets.

If a policy involving some parity concept necessitating income transfer through price supports is adopted, we are confronted by the necessity for a two price system in order to prevent unmarketable surpluses from developing. We must then face the question of whether or not we should allow prices on both the domestic and the international markets to fall to whatever levels may be necessary to move the quantities produced, with a direct subsidy paid to producers to make up the difference between the guaranteed price and the market price or whether the domestic price is to be pegged at the full guaranteed price and only the international price allowed to fall, with or without the payment of export subsidies or the outright absorption of losses on exports by government.

The greater the attempted income transfer to farmers, the greater will be the loss to be covered by the government or the stronger the controls of farm production must be or both. As has been pointed out, even constructed normal market prices guaranteed by government may not wholly avoid the necessity for a two price system, at least on the international market, but the difficulties of formulation and administration would be minimized since the price differential would be less.

If governmental price programs are intended to redistribute income in favor of farmers a series of questions arise which involve our concepts of

social justice. What is the purpose of such income redistribution? Is it intended to enable the farmer to attain equality with other producers? If so, what is to be the measurement of equality? The same per capita income? How are we to treat returns to capital and to land? Should these returns be included in trying to attain equality in per capita income or should equal returns per hour of labor expended be the test? These are only a few of the questions which would arise in trying to quantify egalitarian goals.

A much more practical issue arises, however. Certain farm programs might indeed increase average incomes per farm above those which would exist without such programs. But such price programs might and often would increase the average of farm incomes by causing the real incomes of farmers in the upper half of farm income receivers to rise while either not affecting the incomes of the lower half of farm income receivers at all or even causing an appreciable decline in real income in this group.

Secretary Benson claims that the production of 3.5 million of the nations 5.5 million farms is "so small that the farmer derives little benefit from price supports."[9] If this is so, an addition to the real incomes of the 2 million remaining farmers who might benefit would certainly not raise the 3.5 lower income farmers upward in the direction of equality. Even though these estimates of Secretary Benson are rejected as statistically inexact the principle remains that governmental price programs which increase the average farm income do not automatically reduce inequality in income distribution. Indeed, government price programs intended to redistribute income in favor of the farm sector seem to have a built-in bias towards increasing inequality of distribution of income within that sector.

Direct payments to farmers from the U.S. Treasury would appear to be much more effective in reducing inequality in income distribution. However, the superiority of direct subsidy payments becomes illusory if the payments from the Treasury are made to induce compliance with price programs. In such case the direct subsidies are also likely to go to recipients who are already in the higher brackets of income receivers.

Conclusion

Assuming that there are going to be governmental price programs, I have presented the issues primarily under the two familiar alternatives of price programs which would be intended to provide for constructed normal market prices for farm products, contrasted with parity price programs which are intended to transfer income to farmers through prices higher than those which would exist on the free market or under some synthetic reconstruction of free market prices.

[9] Letter from Secretary Benson, June 9, 1954.

In a crude way, these two alternatives resemble those involved in the "flexible" price supports *versus* "rigid" price supports. The first alternative of the setting of constructed normal prices through some form of governmentally guaranteed forward pricing, of course provides for lower price floors and lower average farm incomes than if the alternative income transfer types of price floors were chosen. Consequently, the income transfer parity price type of price support is bound to have a greater immediate political appeal to those farmers who would benefit from price supports.

What I have called constructed normal market prices, should, however, not have a large range of *flexibility* if they were correctly computed in the first place. For example, the average of such constructed normal market prices if computed at the present time to indicate the proper average support price for next year would be presumably be substantially less than ninety percent of parity as now defined by law. But once computed, unless errors in computation had been uncovered, this average price would logically be maintained by government even in the face of a large fall in demand, if such a fall in demand had been occasioned by an economic recession or depression. Almost the only valid reason for lowering the average of the governmentally supported price would be to prevent the piling up of surpluses if such were to threaten to appear due to an increase in agricultural production on account of technological cost-lowering developments.[10]

It might be necessary to lower the support price for individual farm products, the production of which had become more profitable on account of differential lowering of costs of production, but unless the average of costs of farm products had been lowered, the support prices of other farm products would logically be increased to balance the lowering of costs of other products.

In terms of political appeal, this relatively firm feature of constructed normal market prices might reduce the instinctive distrust which farmers feel for price supports with very much "give" in them and who are consequently likely to consider that *flexible* price supports are about as useful and dependable as rubber crutches.

For the purpose of the exposition of fundamental issues. I have stated the two alternatives in an over-simplified way. In actuality, the two alternatives are very much more complicated. In some ways they even overlap. As has been pointed out, even the constructed normal market price type of support would be simple neither in concept nor in administration.

With respect to the second alternative, the purposive transfer of income to farmers, this does not depend for its income effects simply upon the

[10] There might have to be recomputations of the constructed normal market prices, upward or downward, to allow for a succession of years of abnormal weather.

increase in prices which might or might not be got through restricting production and selling a lesser amount for a greater total price return. In practice, the price return has always been supplemented by benefit or other payments to farmers to induce them to comply with acreage control programs, by export subsidies, by governmental assumption of the cost of carrying and of disposing of farm surpluses or by various other very substantial supplements to farm income through direct payments from the U.S. Treasury.[11] In this way these additional payments to farmers avoid having to be judged on a straight basis of their validity as outright Treasury payments intended to re-distribute national income.

There is no reason in strict logic why constructed normal market prices sustained by governmental forward pricing might not also be supplemented by governmental payments to farmers. Indeed, such payments might be arranged so that they would go in larger degree to those farmers who had greater need for them than do the recipients of this type of benefit under existing legislation and administration. Attractive as this alternative appears, distribution according to need is inherently most difficult of administration, particularly as part of an agricultural program of which one of the primary purposes is allocation of resources. Nevertheless, the possibility of Treasury payments to farmers as a supplement to a program of constructed normal market pricing by government must be considered a real possibility.

Another basic issue is whether governmental price support programs are to be guided by precise formulae, based either upon some parity concept or upon constructed normal prices. We are often irritated by what seems erratic intervention in agricultural programs by the legislative branch. On balance, however, there can be little doubt that the changes in policy from restrictive to expansive by Congress as conditions have changed have served far better in directing policy than any precise formula would have done. Both the legislative and the executive branches of government can be counted upon to take *ad hoc* action when drought at home, famine abroad or the exigencies of war demand it. This will happen regardless of the type of governmentally guaranteed agricultural price programs chosen in advance of events. Judging by the record, we can be glad that this is so, since the mind of man cannot be expected to devise a formula, however ingenious, which can forsee the future.

When at the beginning of this paper I raised the issue of what governmental price programs are intended to do, I asked whether, as one of their fundamental purposes, such programs were intended to serve to

[11] Often, of course, these additions to farm income through governmental payments cannot be simply and exclusively assessed as part of the cost of governmental farm price programs since, as in the case of U.S. foreign aid, the primary purpose of the Treasury expenditure is not to provide additional income to farmers.

maintain general purchasing power in the economy and thus to aid in the maintenance of full employment. Conceivably such a purpose might be intended for either of the two types of governmental price programs.

It has been denied that either type of program could accomplish this purpose. Of what avail in preventing economic depressions is either the maintenance of prices in one area of the economy or the diverting of income from one sector of the economy to another, it is asked?

The answer is that the maintenance of prices in a substantial area of the economy might under some circumstances aid in the prevention of a general price collapse. That a general price collapse produces large scale unemployment of resources needs no argument.

The diversion of income from one sector to another is a different matter. To do so might have either inflationary or deflationary effects, depending upon a number of different circumstances. In general, the diversion of income which would result in greater equality of income distribution might be expected to increase consumer expenditures and consequently to diminish unemployment if such existed or were threatened. The type of governmental price program intended to redistribute income in favor of the farm sector of the economy would not be likely to have this effect for reasons discussed previously.

In any event, governmental programs in support of farm prices cannot be expected to be the major factor in preventing economic depressions. Fiscal and monetary measures, governmental spending programs, the redistribution of income designed to maintain or increase consumption, incentives for investment and other factors in their totality are likely to outweigh by far the effect of farm price programs by themselves.

Conversely, no governmental price programs can be expected to operate satisfactorily in an economy of much less than full employment. Without such governmental price programs we can be sure that the market would not function at all satisfactorily in the presence of substantial unemployment, however. As was pointed out in the beginning, with dynamic full employment we might be able to dispense with governmental price programs in agriculture altogether. Without the maintenance of full employment we are not likely to find any satisfactory solution of the farm problem, with or without governmental price supports.

DISCUSSION

G. E. BRANDOW
The Pennsylvania State University

In preparing his paper on *Fundamental Issues That Must Be Faced in Agricultural Price Programs,* Professor Hoover has been faced with an issue of his own—how fundamental is really fundamental? I agree with what he says about difficulties involved in trying to discuss underlying issues in this area, yet I

wish that he had used his wide experience and his vantage point outside of the specialized field of agricultural economics to go beyond questions immediately involved in choosing among alternative farm price programs. I propose to try to identify a few fundamental issues of another order, even though I may only succeed in demonstrating Hoover's wisdom in choosing to approach the subject as he has.

The first issue on my list is an old one: To what extent should government action modify an enterprise economy? Hoover raised a closely related question when he asked whether we are going to have government price programs at all. Though I agree with him that we are going to have such programs, nevertheless the issue of the extent to which government should intervene exerts a strong influence on the *kind* of program selected. Fundamental differences in views about the proper role of government are often the reason behind the reason why individuals disagree about particular programs. This issue has been an important part of the background against which the latest political struggle concerning farm price legislation has taken place, and it will be a basic source of controversy for a long time.

A second issue is this: Is the purpose of the economy to produce goods and services desired by individuals as consumers, or is it to provide an outlet for things producers want to produce? In a nutshell, should consumer sovereignty or producer sovereignty be the rule? Probably few persons will forthrightly deny the merits of the case for consumer sovereignty, but many only pay it lip service. It seems to me that arguments recently advanced for high support prices for unrestricted output of whatever farmers wish to produce demonstrate that this issue is not a settled one. Criticisms of particular farm price proposals on the grounds that producers won't like the income consequences sometimes are stated in such a way that they reflect a belief in producer sovereignty—unless, of course, the criticism is made by a politician, in which case voter sovereignty usually is the culprit.

One of our most important farm income problems is that of the million or more families who are largely dependent on farming for a living but who have such inadequate production units that they have little economic opportunity in agriculture. This problem raises two closely related issues. To what extent should society take action to induce individuals who are unproductive in their present situations to change occupation or location? And to what extent does society have a responsibility for supplementing, by one means or another, the incomes of individuals in such situations? These issues and the problems to which they relate have received less attention than they seem to deserve. This may suggest a general agreement that society has no responsibility in these matters, but I am inclined to think that neglect of the problem rather than agreement on the issues is the correct explanation.

Hoover has touched upon the conflict between certain farm price proposals and policy in international relations. The broad issue here is: Should the domestic economy adjust to the requirements of freer foreign trade and to a "good neighbor" policy, or should our foreign affairs be conducted so as to minimize current pressures within the various segments of the domestic economy? The issue is complicated by the threat of war and apparent needs for national self-sufficiency in some respects. Hoover's remarks and the wide recognition of this issue make further comment here unnecessary.

An important point about virtually all of the fundamental issues of the

kind mentioned is that they are not confined to farm price programs. Certainly the central issue in arguments about protective tariffs, export dumping and the like is not exclusively agricultural. The existence of unproductive labor resources in certain occupations and locations is not confined to farming; anthracite coal mining in this state is an example of an industry faced with somewhat similar problems and raising the same issues. This comment leads to a sixth and very general issue: Is there any reason why agriculture should receive special attention from government in dealing with problems that have counterparts in other sectors of the economy? For example, though there is sharp disagreement as to the level at which wheat growers' incomes should be supported, most of the participants in the debate seem to agree that support at some level is warranted —and so do I. Would they also favor support of the incomes of coal producers and miners? Of Northern textile workers stranded by the shift of the textile industry to the South? If not, on grounds other than that agriculture is in some sense "more deserving"?

Another example grows out of Hoover's comment that aid to agriculture may serve to sustain total economic activity when depression threatens (though I do not mean to imply that he is suggesting special treatment of agriculture). Perhaps the most effective government action in a particular instance of declining employment may be to reduce taxes or to increase spending in an area other than agriculture. Should spending in agriculture be judged on its own merits as an anti-depression device, or is there reason to say that agriculture should always be a channel through which spending power is introduced into the economy? Again, this question is not confined to agriculture. There are spokesmen in labor and industry, too, who are eager to have their groups serve the cause of economic stability by channeling government money into general circulation.

The last issue on my incomplete list is this: Should government powers be used to promote economic progress and to facilitate the adjustments that progress often entails, or should government preserve the status quo in order to avoid the pains of progress? For example, mechanization has increased the size of farm business at which production costs are at a minimum, has reduced the number of farms and farmers the country needs, and has put rough land unsuited to machinery at a particular disadvantage. Should government restrict the size of farms in order to protect the incomes of families on small units or in hilly areas, or should it do what it can to facilitate the long and painful adjustment forced upon disadvantaged farmers through no fault of their own?

This is not an academic question even now. Acreage restrictions, especially of the composite type to be used in 1955, tend toward limiting the size of farm operation, and the still-alive Brannan Plan explicitly discriminated against the larger farms. The same issue is raised when people ask, as some are now asking, why the government should pay for research on yield-increasing production practices when farmers' "real problem" is that they are already producing too much.

This issue, too, is much broader than agriculture. Labor, for example, has sought government sanction of featherbedding, a device used to offset labor saving efficiencies in industry. We are in an era when government is increasingly an instrument through which we seek to attain economic ends, and this issue relating to the role of government in a dynamic, changing economy is likely to become more important in the decades ahead.

DISCUSSION

W. E. CHRISTIAN, JR.
Mississippi State College

Dr. Hoover has done an excellent job of ferreting out some of the fundamental issues of our farm price support program. He has made no attempt to list what he considers to be all the fundamental issues nor has he made any attempt to rate the issues which he has discussed as to their importance. This, I consider to be fortunate for complexity of both our price support programs and the economic system in which they operate would make such attempt, if not impossible, at least to a considerable extent meaningless.

With the exception of several statements which are true only under certain assumptions that are not stated but perhaps are implied in Dr. Hoover's paper, I find myself in substantial agreement with what he has given us.

Hoover first discusses the issue of whether we are going to have governmental price support programs. He concludes that we are likely to continue to have a price support program although he points out at least three situations which could mean the abandonment of a price program—first, an intolerable administrative situation; second, a pronounced upward shift in demand for agricultural products; third, a pronounced downward shift in supply of agricultural products. He next discussed the issue of what governmental price programs are intended to accomplish. Again, he gives three possible goals: (1) reduction in price fluctuations through some type of forward pricing; (2) a transfer of income to farmers from other potential recipients; and (3) an anti-depression device. In general, the situation which he describes as leading to the possible abandonment of a governmental price program are situations that could be expected to lead to the abandonment of the program only if the goal of the program is intended to increase the farmer's share of national income for the three reasons he gives for possible abandoment of the program would not necessarily be valid if goals (1) and (3) were adopted.

Hoover undoubtedly had a purpose in discussing the issue of whether we would have price supports before he discussed the issue of what price supports are expected to accomplish. Nevertheless, I believe we would have profited had Hoover seen fit to discuss the issue of what governmental price programs are intended to accomplish and then discussed the issue of whether we would have a program incorporating one or more of the three general objectives outlined.

In discussing some of the issues involved in adopting any one of the goals of a governmental price program, Hoover makes an important point which might be further emphasized—that is, if an attempt is made to increase the farmer's share of the national income through some "parity concept," setting a guaranteed price above the price that would exist in the absence of the support does not necessarily mean additional real income to the farmers unless (1) we have additional governmental subsidies to the farmer or (2) we have production controls and/or surplus disposal programs. Even if we have production controls, whether the restriction of production of most agricultural products will increase returns to farmers over time is still largely unanswered. Granting the fact that all evidence points to a highly inelastic demand for most farm products, little attention has been given to the effects of the cross elasticities of both supply and demand of certain price supported commodities and their

substitutes. There is little doubt that synthetic fibers have been substituted for cotton, oleomargarine for butter, etc., but there is little empirical data for determining to what extent the guaranteed price support program has affected the cross elasticity of demand for these products, and/or the cross elasticity of supply. The elasticity of demand for a farm product may be low enough on a year to year basis to give substantially higher gross returns for any particular year if production of the product is restricted, but if restricting supplies and raising prices cause the cross elasticities between the commodity and the substitutes to increase, returns to the producers of the supported product might, over the long run, well be reduced rather than increased. These cross elasticities probably have been ignored largely because of the difficulty of dealing with them in a dynamic economy. Even when changes in the cross elasticities of supported agricultural commodities and their substitutes (both on the supply and demand sides) are estimated, it is extremely difficult to determine whether these changes are a result of the price support program or are merely part of the dynamic nature of our economy.[1]

Hoover states: "If a policy involving some parity concept necessitating income transfer through price supports is adopted, we are willy-nilly confronted by the necessity for a two-price system in order to prevent unmarketable surpluses from developing." I presume from his paper that Hoover would class a direct subsidy paid to producers as a two-price system but even then, I am not sure that I can agree with his statement. I suspect that within the political context Hoover is largely correct, but if we really want to control supplies, it can be done if farmers and consumers are willing to pay the price. The control of supplies when the governmentally guaranteed price is above that which would exist in the absence of the guaranteed price is certainly one of the fundamental issues to be faced if income transfers to farmers are accepted as a goal of governmental price programs. In the past the control of supplies has been attempted for a number of commodities through the establishment of acreage controls and marketing quotas. Even though we accept the thesis that the governmental price program has not caused serious mal-allocation of resources over the last decade or so, there is little doubt that in years when these acreage controls are in effect, the allocation of resources within the farm units is in many cases different from what it would have been in the absence of these restrictions.

What has actually happened is that a "pseudo resource" has been added to the production and marketing process—namely, the acreage allotments and marketing quota. In varying degrees this "pseudo resource" has been capitalized into the value of land to which it has been tied through acreage allotment. It seems to me that two questions need to be raised: (1) Do we really want to restrict the quantity of the products available and (2) If we assume that this restriction will mean increased total return, is it desirable that this return be capitalized into land values; or do we want it in some way tied to the individual farmers as a laborer or entreprenuer. If we want the latter, then there appears to be considerable merit in abandoning the idea of acreage controls and depending upon marketing quotas. In such a situation, the Secretary of Agriculture could determine the desired total production, and issue marketing quota to individual farmers. These quotas could be made transferable and could be bought and sold through some kind of organized market. This would

[1] There is also a welfare problem involved in these changes which I cannot discuss at this time.

permit the individual producers to produce his quota on as many acres as would be desirable or sell his quota to someone else. Provisions might be made in the case of storables so that producers who have produced more than their quota could carry the product forward and use the quota that they might receive the following year. Provisions might also be made so that the highest price for the marketing quotas would not exceed a certain level by permitting the Secretary of Agriculture to sell additional quotas—say, at a price to be established in somewhat the same fashion as the penalty for excess production is now established.

In such a situation a producer who has produced without a marketing quota or has produced in excess of his marketing quota would have three possible alternatives open to him: (1) Buy a quota from other holders of marketing quotas, (2) Carry the product forward to the following year when he might expect to be issued a regular quota, or (3) Buy additional quotas from the Secretary of Agriculture.[2]

A program of this type would permit the benefits (if any) to accrue to the individual holder of the quotas rather than to the owner of the land and would at least give the farmer greater flexibility in the combination of resources used in the production of the supported product. The problems of determining the basis for allocating the marketing quotas would be difficult ones.

One final remark regarding Hoover's last statement—"Without the maintenance of full employment we are not likely to find any satisfactory solution of the farm problem with or without governmental price supports." As long as we have an absolutely declining industry in terms of the use of any resource such as characterized the use of labor in agriculture in the past couple of decades, the return to the resource is likely to be more or less continually depressed below the return to the comparable resource in other uses. Therefore, the maintenance of full employment is likely to be very helpful in settling the issue of whether we will have a government price program that either will be used to transfer income from other potential recipients to the farm sector or used as an anti-depression device. Full employment would not necessarily stabilize farm prices although it would have a pronounced influence upon the fluctuations. It must be added, however, that barriers to the free flow of resources between agriculture and the rest of the economy in some areas have and are likely to continue to exist even with full employment unless other types of policies are used.

[2] A proposal somewhat along these lines has been made by George K. Brinegar, and S. Johnson, in a recent article in *This Journal* except that acreage allotments would be retained but made transferrable. If acreage allotments are used and marketing quotas based on the acreage allotment, the problem of producers substituting other resources for land would still remain, thereby defeating in part the purpose of the restrictive program.

THE INSTABILITY OF FARM PRICES RECONSIDERED

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IT IS characteristic of most farm prices to fluctuate widely when market prices are free of government intervention. These price fluctuations give rise to difficulties for small private firms in agriculture—our typical family farms—which on other grounds are a preferred way of farm living and of organizing agricultural production. Government is, therefore, called upon to reduce these price fluctuations. The efforts of government on this score, however, have been far from satisfactory. They have been unsatisfactory because of the mixture of public purposes that have entered into farm price policy, because of some of the mistaken beliefs about the demand and supply characteristics of farm products and because of two misleading, widely held beliefs about the functions of farm product prices. I shall take up each of these issues to clear the ground for some reflections on the problem of farm price instability.

Public Purposes of Farm Price Policy

Even a cursory review of the record of governments, no farther back than the late thirties, reveals not one but a number of different public purposes in pricing farm products. By some, farm product prices have been held down, as was generally the case during the war years, or they have been held up, as has been done more recently, notably by the government of the United States. The principal purpose of these acts, however, has not been to resolve the instability of farm prices.

1. During the war years some farm product prices were held down somewhat mainly in the United States to check the rise in the cost of living. This rise in living cost was not a consequence of the instability of farm prices but arose chiefly from the inflation which had been given its head by the then prevailing fiscal and monetary policies. With hostilities in Korea, some farm prices were again held down, for example, in the case of wheat and corn, simply as a consequence of the fact that just previously the Commodity Credit Corporation had accumulated large stocks and which were then sold.

2. Farm product prices also have been held down in other countries, not only to check an inflationary rise in cost of living but in many of them for quite other purposes. Some have been holding farm prices down in the belief that by doing so they would achieve economic development which has come to mean industrialization—the hum of factories and the chant of steel mills—the lure of which few of the less developed countries

have been able to withstand. Let me cite only three: the ABC countries of South America—Argentina, Brazil and Chile striving to industrialize have pursued a policy of tipping the scales of relative prices against agriculture. Then, too, as a part of the world wide rash of exchange controls of the last decade and longer, some countries soon found these controls a convenient way of acquiring additional public revenue by administering a form of multiple exchange rates adverse to agricultural exports. Some countries, also, undertook state trading. By buying the major exports of the agricultural sector cheap and selling them dear to other countries they added to their public revenue. The government of the Argentine, for a few years, acquired vast amounts of revenue in this way. Brazil has been doing so through its multiple exchange rates and exchange auctions and has taken a large cut out of the windfall in prices that coffee enjoyed.

3. There is also the record of governments acting to hold up farm product prices for purposes other than farm price stability. The industrial countries which are dependent on food imports gave extra price incentives to their farmers during the war years. Following the war, exchange difficulties became for most of them the pretext for continuing this kind of a price policy. The United States for quite different reasons has held up farm product prices twice, in a major way, since 1946. It did so, first, during the 1948-49 recession and, again, following the decline in U. S. farm exports which set in after the middle of 1952 and on into the recession which has characterized the past year and longer. We now stand in the long shadow of the mountain of stocks that this price policy has accumulated.

Suffice it then to say, as one looks back over the years since 1939, the war period and its aftermath, that many governments have taken measures to control farm prices in one way or another and that the underlying purposes of these measures have been many but, in the main, have not been to resolve the instability of farm prices.

Beliefs about the Demand and Supply Characteristics of Farm Products

Much of what is said about the pricing of farm products, including the problem of farm price instability, turns on particular beliefs. There are broad areas of agreement as well as some important disagreements about the demand and supply characteristics of farm products, to which I shall now turn.

1. There is the belief that the *income elasticity* of the demand for farm products where personal incomes are as high as in the United States is far over on the inelastic side. For farm foods as measured by the old BAE

index of food consumption it may be about .25, and there is now some evidence that it may be even less than this. In 1945 when I first ventured the belief that this elasticity was in the neighborhood of .25, a flurry of doubts were expressed, some contending it was not .25 but 1.0; these doubts arose in the main from differences in explaining the substantial rise in per capita consumption of food that occurred during the war years. However, as I read the literature, there is now substantial agreement.

2. The *price elasticity* of the demand for farm products in the United States is also inelastic. For farm foods, again taking the concept of food embedded in the old BAE index of food consumption, it is not likely to be more than −.5 while a more plausible figure is one in the neighborhood of −.25. Although beliefs about this characteristic of the demand tend to merge, there is less statistical support for it than for the income elasticity because of data limitations and methodological difficulties in depending wholly on observations based on time series.

Beliefs about either the income or the price elasticity of the foreign demand for U. S. farm products are so nebulous that they provide us with no meaningful building blocks.

3. What is said about the *shifts of the demand schedule* of farm products leaves much to be desired. Not that there is disagreement about these shifts so much as a lack of knowledge about them. Received economic theory is as yet not entirely adequate for organizing the data and inferring from them the behavior of these shifts. Too much of a burden is placed on two variables, i.e., on population and on income. Yet by no means all of the shifts in the demand for farm products are explainable by changes in these two important factors. Notions about lags and leads have not been fruitful. The ideas represented by expectations appear relevant but difficult of application. The demand for stocks—i.e., for private stocks held by traders, processors, consumers in wardrobes and food lockers, withheld by farmers, and for public stocks held by the CCC and other governmental agencies—is bound not only by price, income, and population but also by other complex circumstances which at times appear to shift the demand schedule of farm products[1] about in a perverse manner.

4. Turning now to the supply schedule(s) of farm products there is undoubtedly general agreement that in the long run a constant supply price comes close to characterizing the U. S. agricultural sector. Given enough time for all costs to become variable costs, the rates of substitutiion among factors are such that neither land nor any other major inputs is in a position of a limitational factor over a substantial range of production. Also, looking back over the dynamic record of U. S. agriculture during the last

[1] I refer here only to the demand schedule that confronts farmers at the point at which they sell their product.

quarter of a century, the realized supply prices of farm products have, over the years, tended to stay remarkably constant relative to each other and also, when one compares all farm product prices with all other product prices. The parity index, as a crude indicator, suggests a decline of about 15 percent in four decades—from a parity of 100 to one of 85 under conditions of full employment.

But whatever one's belief may be about the long run characteristic of the supply schedule, it has little or no relevance to the problem of farm price instability. This is essentially a short run matter.

5. The state of beliefs among us about the elasticity of the supply of farm products, in what may be viewed as a short run context, is one of the major sources of confusion as to what is being said about farm price policy. It will be convenient at this point to leave aside the concept of the *stock period* as I have used this particular concept in my *The Economic Organization of Agriculture*. A concept of supply that is relevant to the problem under consideration must cover a long enough interval of time so that farmers can alter at least some of their production plans. I prefer to define this particular short run as consisting of two production periods which for many agricultural products implies two years.

In a short run of two years does the supply schedule of farm products have any elasticity whatsoever? On this, one must say that prevailing beliefs diverge widely. I doubt, however, that these differences in views have arisen mainly out of theory. Rather they have their origin in difficulties that arise in organizing and interpreting the data considered relevant. It is disconcerting, to say the least, to admit (although so many among us specialize in farm management and production economics applied to agriculture) that so little useful work has been done on the elasticity and the shifts of the supply schedule of particular and of groups of farm products. I hasten to add, however, that the widely held belief that this supply schedule is vertical in the short run, against a lower relative price, is not one that has been promulgated by workers in farm management.

The key to the matter is in the observed changes in *production plans* made by farmers in response to lower relative prices of farm products. For it is on these observations that prevailing beliefs differ importantly. Put in this way, it represents a difference in beliefs about observable facts. The matter should be resolved by an appeal to relevant data. My belief, which appears to run counter to the main stream on this issue, is simply this:

> That over a time span of two years, under conditions of full employment and abstracting from weather, farmers in the United States alter their *production plans* to produce less when confronted by lower relative farm product prices, that are below the normal supply price, than they otherwise would plan to produce.

To discover that weather is a variable is not enough to put this statement to test! Nor can the state of employment be left out; some who have argued that no elasticity exists are being confused by some of the production effects of unemployment. Moreover, what makes the statistical task so hard is that planned production and realized production, of farmers in particular, are seldom, if ever, one and the same thing.

Let me venture the belief that it is not valid to represent the agriculture of the United States as having a vertical short run supply schedule in relation to a lower relative price. Rather I suggest that this schedule has an elasticity in the neighborhood of .3, over a two year period, with a lower relative price of 10 percent or more below a general parity of 85, as it is now calculated.

6. Lastly what is received doctrine on the behavior of the shifts of this supply schedule? The concept of supply shifts has not as yet been forged into a useful tool. Theory, unfortunately, gives us only a weak reed for organizing data to guage supply shifts. The task, moreover, is not an easy one for it may require a theory that will explain economic development as a whole and this we do not have.

On the descriptive level we know that the short run supply schedule of farm products has shifted far to the right over the years, but once again, it must be said, we have no satisfactory explanation of the underlying process. I find the notion that there exists a pattern of shifts to the right characterized by spurts and stops, caused by the fitful way in which farmers adopt new techniques of production, quite implausible. Economic growth and development, either of agriculture or of the economy as a whole, is not a one variable affair. Nor are production plans of farmers, leaving weather aside, subject to sudden upward spurts. Until we know more, we may do no better than to describe the shifts of this schedule as a rather regular forward movement (to the right) of 1½ to 2 percent a year when farm prices are at or near normal.

Let me pull this set of threads together. Take, first, the demand. We find the domestic demand for U. S. farm products to have both a low income elasticity and a low price elasticity. We, however, have no comparable knowledge about the foreign demand. The domestic schedule shifts with income and population but these two variables are not by themselves a satisfactory explanation of such shifts. The demand schedule confronting farmers at the point of first sales appears to be subject to some perverse shifts arising from fluctuations in the demand for stocks. Next, we are of the belief that the supply schedule of U. S. farm products has some price elasticity in a short run of two years. Economic growth and development has been shifting this schedule to the right as an average rate somewhere between 1½ and 2 percent per year. And, then, there are the effects of

weather which give rise to important divergencies between realized and planned agricultural production.

Beliefs about the Functions of Farm Product Prices

Economists whose image of the world is shaped by economic theory do not always assign the same functions to prices as do those whose model of economic activities is that of power politics. However, he who ventures to mix these two bits of theory does so at his own risk and no one will stand by to mourn for him! Yet proceed we must.

All may agree that among the functions of prices are the following: the distribution of crops (production) during the stock period (important as this function is in the case of agriculture, it receives very little analytical consideration); the organization of production and its distribution from one production period to the next; and the organization of economic growth and development, including savings and investments under conditions of risk and uncertainty.

Hard as it is to analyze or to institutionalize this set of functions, let me turn to another set on which prevailing beliefs are sharply at variance.

1. There is the belief that farm prices should be used to transfer income to farm people beyond that which would come to them from sales at market prices without government action for this purpose. Those who see such income transfers as a function that should and can be borne by farm prices, properly administered by government, rest their case on two factual beliefs, namely, one, that farm people are relatively poor, and, two, that income can be effectively transferred by means of administered farm prices.

Are farm people poor compared to the rest of the U. S. population? Such data as are at hand for the fifties do not permit an unequivocal affirmative answer. Most of the farm families who produce most of the farm products sold for a price are fairly well up on the U. S. income ladder. Commercial farmers are in the main not poor by American standards. Poverty in agriculture does characterize about 1½ million farm families; they, however, live on and operate principally low production farms from which comparatively little is sold.

How effective are farm prices in the hands of government in making such income transfers? If they were to work, they would benefit in the main not the farm families who are really poor. When they work, as they have in the case of tobacco, the extra income soon becomes embedded in land values, as one would anticipate from even the most elementary economic analysis.

In passing an adverse judgment upon the belief that farm prices should be used to transfer additional income as I feel must be done, doing so in no way questions the propriety of a government pursuing progressive in-

come and inheritance taxation and other policies to redress the existing inequalities in the personal distribution of income.

2. Another widely held belief is to the effect that administered farm product prices are required and can be used effectively to counteract elements of monopoly power exercised by other groups in the U. S. economy. Are they required? An affirmative answer implies that there is at hand convincing proof that the U. S. economy is beset by power politics in economic affairs and that as a consequence product and factor prices are substantially distorted judged against the competitive norm of the economists. But where is the evidence? It is of course also hard to prove the contrary. Nor do I want to imply that all of the burden of proof should fall on those who advance the hypothesis that labor and business and others are seriously distorting prices to their advantage. I, however, remain a skeptic on this vital issue.

But let us suppose this were the state of economic affairs; Is it desirable and can the government administer farm product prices so as to counteract most or some of their adverse effects upon U. S. agriculture? Surely the record of the last twenty years does not provide any convincing evidence for the affirmative. Let it suffice merely to assert that on the basis of what has been done, the facts appear to be that it cannot be done.

Here, again, in making this adverse judgment, I do not want to imply that the government should not be vigilant at all times in its efforts to redress concentrations of private economic power. There are, however, other and effective ways of strengthening competition among firms and individuals.

The Instability of Farm Prices

We began this paper with the observation that most farm product prices fluctuate widely when market prices are free from government intervention. The characteristics of the demand and supply of these products provide a basis for an explanation for such price fluctuations. With both schedules far over on the inelastic side, any substantial shift of either schedule independent of the other, away from its normal path of growth will necessarily cause a large movement in the price. A non-compensated shift of either schedule of not more than 5 percent, where the price elasticity is in the neighborhood of $-.25$, implies a price movement of about 20 percent, which may be large enough to create some financial difficulties for many family farms.

The key to our problem is to be found in the shifts of the demand schedule confronting farmers and in the variations in output caused by weather. This means that I take the low price elasticity of the demand at

retail as representing the preferences of consumers and the low price elasticity of the supply of farm products, in a short run of two years, as representing the real rates of substitution among factors. The latter is subject only to slow and gradual modification, that is, the elasticity of supply, at full employment, will increase as the proportion of all inputs employed in agriculture purchased from the rest of the economy increases; and, this has been the drift in recent decades. Furthermore, my image of the year-to-year changes in the *planned production* of U. S. farmers, at normal prices, is one of gradual growth attuned to the over-all economic development of the economy. This representation, which I take as my working hypothesis, places the major burden of farm price fluctuations upon shifts in the demand schedule confronting farmers at the point at which they sell their products and upon the unplanned variations in production which are caused by weather. In its simplest terms, this representation means that if the planned production of agriculture were attuned to a rate of growth of, say, 2 percent per year, if the demand were to increase steadily at this same rate and if weather were not a variable, the problem of fluctuations in farm product prices would not exist.

Our erratic, continental weather is not one of those unknowns that must be discovered, difficult as it is at times to isolate and analyze its production effects. The shifts in the demand, on the other hand, are not so easy to behold. It is my tentative belief that the demand which confronts farmers is subject to three important classes of shifts which cause this schedule to depart substantially on short notice from its normal path of growth. One of these is the increase or decrease in the foreign demand for U. S. farm products; an example of this was the abrupt decline in this demand that occurred after the middle of 1952. Another class is represented by fairly sudden changes in the private demand for stocks. The swings in our over-all economic climate—the stuff out of which expectations are made—are still large enough to alter appreciably these private demands for stocks; the drop in farm prices in 1948-49, despite the rapid accumulation of stocks by the Commodity Credit Corporation, compensating as were their operations, appears to have been an example of this class. The third class is part and parcel of the expansion or contraction of purchases by the government related to mobilization, war and its aftermath. The armed services must be fed; the pipelines of these services are not only big but they can become very long; and more is necessarily consumed and unavoidably wasted per person than is the case normally in serving the civilian population.

So much, then, on diagnosis. What positive measures are appropriate under these circumstances? To compensate for some of the variations in production caused by weather, a positive storage policy is required,

geared not to parity or to some similar price formula, but to *crop yields.* Private storage is not enough; moreover, private storage can be quite perverse because of the way price expectations can turn for reasons wholly unrelated to the effects of weather upon yield. Such a storage policy should be administered in accordance to a set of relevant and well defined rules. The recent RMA research of Robert L. Gustafson and George Tolley at the University of Chicago provides such a set of rules for corn. The application of these rules will not, however, entail stocks as large as I formerly had felt would be required; nor will they reduce the fluctuations of prices as much as might have been anticipated.

In adjusting to, or coping with, the three classes of shifts in the demand schedule of farm products outlined above, the solutions in principle are fairly straightforward; to put them into practice, however, is quite another matter. When the foreign demand for U. S. farm products changes, as it did during 1952, it becomes necessary for domestic production to accommodate itself to such shifts in the demand. To do so effectively, in the 1952 case for example, a lower price was required to guide and induce the required adjustments in production. Acreage controls are not appropriate to this task. It should be clear in view of the above proposal that the belief that the supply schedules of wheat and of other commodities in this group are wholly vertical is not, in my judgment, consistent with the facts for reasons that have already been elaborated.

Shifts in the demand related to changes in requirements of government are on about the same footing as are those of the foreign demand. It is necessary here, too, for the economy to accommodate itself to these shifts and for this purpose price changes are needed so that both producers and consumers will proceed to put their houses in order. This proposal does not rule out consumer rationing under certain critical conditions.

One class of shifts in demand remains. The economic climate is seldom if ever stable; for a while it is bright and rosy and then it becomes dull and dreary. Inflation and deflation may be a part of such a scene; per capita real incomes of consumers may rise briskly for a stretch and then hesitate and even decline. Many individuals see fit to shift back and forth from money and near money to real things including stocks. The more storable farm products are always vulnerable to these attributes of our unstable economy.

It would appear that the very low income elasticity of the demand for farm food at retail would provide a substantial safeguard and it probably does for small changes in the upward drift in per capita incomes. The difficulty, in the main, appears to arise at other points in the economy. The first line of defense still is as I have long contended, a set of measures, mainly fiscal and monetary, to keep the economy as a whole on an even

keel and growing. But a second line is also required in the case of agriculture to safeguard the level of farm prices and the flow of income of agriculture. I shall not burden you by repeating these measures which I have elaborated elsewhere. Let me say, however, these are not measures to counteract the political power that other economic groups may have over their product and factor prices; nor are they measures to transfer income to farm people beyond that which is consistent with normal market prices.

DISCUSSION

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In preparing this discussion, I have assumed that my responsibility included a somewhat critical appraisal of Mr. Schultz's paper. The resulting concentration on differences of opinion or questionable points of analysis should not, however, detract from the obvious merits of his paper.

My first impression of this session was that we were to learn something of the comparative private and social cost of alternative means of reducing the instability of farm prices. Mr. Schultz has exercised his prerogative of changing both title and subject matter and in the process has come up with a restatement of his views with a few new wrinkles added.

Schultz hypothesizes that the major responsibility for farm price instability lies in shifts in demand at the first point of marketing and on (unplanned) variations of production caused by weather. He argues that planned changes in production, at or near normal prices (whatever they are) are gradual and attuned to the economic development of the economy at a growth rate of 1½ to 2 percent per year. Since this hypothesis is restricted, by definition, to periods of normal prices, one must ask at least 3 not unrelated questions: (a) What is an operationally satisfactory definition of a normal price period? (He intimates periods when the parity ratio is between 85 and 100 but not explicitly so.) (b) To what extent has he ruled out, by definition, the most important and most difficult aspects and times of our growth process? and (c) Is it likely to be very fruitful to push a somewhat static hypothesis such as this in a dynamic and developing economic continuum such as characterizes the American economy?

I feel confident that he has, by almost any definition he chooses, ruled out of applicability, perhaps as much as half of the time since 1920. He finds implausible a shifting of the supply schedule based on a pattern of spurts and stops in the adoption of new techniques of production. This assertion is made in a general context and presumably applies to all recent time. But Schultz offers us nothing in explanation of technological advance in non-normal price periods. By his emphasis on the gradual aspects of technological advance in near normal price periods, may we assume them to be non-gradual in non-normal price periods? Technological advance may be more dynamic than Schultz thinks. And furthermore, is the rate of adoption of technology unrelated to its availablity or applicability?

Schultz's extension to a two year time period for purposes of showing that then some positive supply elasticity exists is merely a special case of the general

proposition, long well known, that demands and supplies are more and more adjustable, the longer the time period under consideration. But again, this pretty largely begs the question of the process of change in which economic decisions are made.

Given the tendency for farm price instability, what are we going to do about it? Schultz's prescription seems to be this: For that part caused by weather—storage by the public administered by "relevant and well defined rules" in addition to private storage. But he agrees this won't reduce price instability very much. If foreign or government demands for military and other purposes change we will have to adjust ourselves to them. For catastrophic events like major deflation—compensatory or income payments; for inflation—perhaps consumer rationing. But in order to minimize the chances of major deflation or inflation—mainly fiscal and monetary measures designed to maintain stable growth.

Now while most of us would be willing to accept better storage policy, compensatory payments and better monetary and fiscal policy as a minimum prescription—are they enough in view of the price problems agriculture faces? Without effective measures on the demand side we can be sure considerable price instability will continue to be with us. I gather, by omitting discussion of the price support (forward pricing) programs of the last 15 years, Schultz would either abandon or relegate them to a minor role. To me this would be wasteful, unwise and unrealistic. (In the interests of time, however, I will not argue it at this point; nor does this imply that the philosophy and administration of the programs have been faultless nor that they represent the major means of reducing glaring inequities or the malallocation of human or material resources in agriculture.)

In view of the uncertain state of effectiveness of available measures to reduce price instability, programs designed to help farmers by group action or individually cope more effectively with varying prices may have an important role. This alternative on an individual farmer basis has been discussed by Schultz elsewhere, but perhaps discarded inasmuch as this attack might call for more resources and perhaps a less efficient use than under a state of relative certainty and the competitive norm.

Schultz's assurances that measures he recommends are not measures inconsistent with, "normal market prices" or that actions should not be taken to give farmers income "beyond that which would come to them from sales at market prices without government action" represent an excessive solicitude for the so-called competitive norm. As has been well stated elsewhere, "the propositions of economic theory do not necessarily say anything about conditions in the real world."

While we as economists may dream about the potential gains from reducing farm price instability, let us not forget that most price-influencing measures have arisen out of the needs, desires and problems of people as they conceived them. We are interested in people, and such related concepts as equity, justice, progress and welfare, as well as efficiency in resource and product use. Rational price policy has the complex problem of steering the best course among several somewhat unprecise goals or sets of values, including best resource and income allocation, maximum security and progress and minimum social tension. Since the several ends may be partly complementary and partly competitive as well as being more or less surrounded by uncertainty of concept and measurement, our role as economists, while by no means unimportant, will be a limited one.

Considering the nature of the problem, our best efforts will probably never be completely satisfactory as measured by one or two standards or points of reference. To play our role more effectively we will have to be more political economists and less just plain economists. If we would be less concerned about the fact that intervention in the pricing field has been undertaken for so many other purposes than that of achieving price stability and instead determine and spell out the nature of available choices in as detailed and concrete form as possible to solve or minimize problems before or as they present themselves we will be fulfilling our responsibilities more effectively.

DISCUSSION

GEORGE MONTGOMERY*
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Professor Schultz has made an interesting and important contribution to the program of our meetings by giving emphasis to an area in which knowledge is deficient. He has analyzed effectively the nature of the changes in aggregate output of food. He has emphasized the responsibility of agricultural economists in developing this area and has challenged young economists to carry forward or build on the foundation that was established by the supply-response studies of the 1920's. Part of the credit for bringing attention to the economic relationships dealing with the aggregate output of food should go to Willard Cochrane for the journal articles of recent years and also for the excellent paper presented at the opening session of these meetings.

Schultz has done an excellent job of discussing a specific topic but he failed to utilize fully an opportunity to discuss a currently important topic: stabilization of farm prices. He has given us a comprehensive analysis of the nature of supply and demand relationships as causes of price instability but he did not go as far as some may wish in discussing alternative ways of reducing instability. From the title of the paper as listed in the printed program it is assumed that discussion of alternative ways of reducing instability of farm prices was intended. Referring to ways of reducing instability of prices, in the concluding paragraph of the paper Schultz states that "The first line of defense is . . . a set of measures mainly fiscal and monetary to keep the economy as a whole on an even keel and growing, but a second line is also required in the case of agriculture to safeguard the level of farm prices and the flow of income to agriculture." Schultz has said that he will not bore us by repeating these measures which he has discussed elsewhere.

Schultz might well have given us some of the analyses and conclusions set forth in his book, *Economic Organization for Agriculture*. It would have been appropriate to discuss some of the implications of price control programs for society and for individual farmers. For example one of the proposals in his book is larger farms so that individual farmers are better equipped to absorb price risks. This is a challenging proposal, especially as applied to the current problems of adjustment of the wheat industry in the Great Plains area. If we are to shift from grain to livestock in the Plains area it probably will be accomplished

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by moving to units of larger acreages, larger investments of capital, greater reserves of feed and finances, fewer people, perhaps decreased income for the area but possibly larger income per operating unit. These possible trends suggest far-reaching implications not only for the organization of resources but on institutional arrangements. What does more livestock and larger farm units imply in respect to tenant arrangements, ownership and transfer of real estate, taxation and financing for schools, roads, and other public services? Kansas has a law prohibiting corporations from engaging in farming. Will this at some time in the future be an impediment to livestock production and feeding operations under conditions existing in semi-arid regions where feed and financial reserves must be large?

Another point discussed by Professor Schultz is expansion by agriculture to meet military needs. What is the obligation of society to protect farmers from sudden price adjustments in post-war periods? Is society's interest and consumer's welfare furthered by stable prices? Will an analysis of wheat income and price policy yield conclusions similar to those of the study of the potato program?

We need additional information about the aggregate output of food, but we also need to devote additional research effort to understanding the implications both for society and individual farmers of programs directed to the stabilizing of farm prices.

LONG-TERM PRICE OUTLOOK AND AGRICULTURE

Chairman: Francis A. Kutish, Iowa State College

THE LONG-TERM PRICE OUTLOOK AND ITS IMPACT ON AMERICAN AGRICULTURE*

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IN THE beginning, let me establish a few ground rules. First, the long-term in this discussion means the next 20 years or so. By setting a time limit, it is possible to evaluate fairly specifically the effects of such long-run influences as population, productivity and income growth. Second, I would make clear that such conclusions as are presented on the price outlook are bound by specific assumptions of major variables—and, thus are not forecasts. Even so seasoned an observer of economic fluctuations as Schumpeter has written: "It is obvious that the external factors of economic changes are so numerous and important that if we beheld a complete list of them we might be left wondering whether there was anything left of business fluctuations to be accounted for in other ways. In fact, it would be possible to write without absurdity the history of business fluctuations exclusively in terms of external factors, and such a history would probably miss a smaller amount of relevant facts than one which attempts to do without them."[1]

Important Past Trends

Yet, something of value in understanding price behavior under specified conditions can be gained from considering the characteristics of price movements in the past.

1. A look at the history of wholesale prices in the United States over the past 150 years shows clearly that the big movements in prices were the result of wars and the aftermath of wars. The War of 1812 brought a rise of 50 percent in average wholesale commodity prices. The Civil War as well as World Wars I and II each resulted in a doubling of the wholesale commodity price level from levels prevailing before the wars. There is no significant evidence that we have improved our relative position over the years in fighting wars and inflation at the same time.

2. The year-to-year changes in prices in the United States over the past century and a half do not indicate a tendency to increase more often than to decline. During the century of the 1800's, there were more years of

* The views expressed in this paper are the author's. They are not official findings of the agency by which he is employed.

[1] *Business Cycles*, McGraw-Hill, N.Y., 1939, p. 11.

price decline than of price increase—and for that century at least, it is difficult to ascribe an underlying inflationary bias. Following the Civil War there was a period of some 20 years of slowly declining prices and apparently relatively low levels of production which some attribute to the hard money policy of those years. In the 53 year period since 1900, there have been only 20 years of price decline. This is not surprising in view of 2 World Wars and the Korean outbreak. Furthermore, the large backlogs of demand left over from World War II, gave rise to conditions of over-full employment, the willing concession of wage increases beyond gains in productivity per man-hour and the wage-price spiral of the late 1940's. In contrast to the last postwar experience, the high employment period of 1922-1929 was featured by a very high rate of increasing productivity per man-hour (about 4 percent a year), a much smaller increase in average hourly earnings in manufacturing (about 2½ percent a year) and slowly declining wholesale prices of industrial products (slightly over 1 percent a year).

3. After each war-inflation period, prices showed considerable resistance to reverting to prewar levels. Except for the current postwar period, wholesale commodity prices at some time after each war did return to the level prevailing before the war. However, this occurred only during periods of depressed economic activity and generally these low prices were not maintained for long. In the current postwar period, declines in industrial production have been held, so far at least, to 10 percent. The wholesale price decline (7 percent) in the recession of 1948-49 and price stability in the 1953-54 recession, were fairly consistent with price behavior for 10 percent declines in industrial production in earlier periods. In 1920, 1929 and in 1937, when the decline in industrial production reached 10 percent, the drop in wholesale prices was only 2-3 percent. It was only after further reductions in output, employment, and incomes that substantial price declines occurred in the earlier periods.

4. Retail prices of goods and services have generally showed less flexibility on the downside than wholesale commodity prices. The historical record of consumer prices over the past 40 odd years (reliable figures are not available for earlier years) shows that they do not revert to prewar levels even under depression conditions. This is due not only to their inclusion of commodities at the final stage of processing and distribution but also to the inclusion of service rates directly, such as utility and transportation rates, and medical fees which rise much more easily than they lower. Thus, for declines of 10 percent in industrial production, the effect on the consumer prices has generally been negligible.

5. One additional point is worth noting. Short-lived price situations are generally more vulnerable to instability than price situations which have

prevailed for a considerable period of years. The current postwar price structure has existed for almost a decade and many cost-price relationships are the more-enduring from that fact.

What are the conclusions that can be drawn from this brief review of price history?

If wars or expanded defense programs which strain the nation's resources are avoided—and I have no basis for judging that probability—the long-term price outlook depends largely on (1) how well the levels of employment and income are maintained in relation to future population and labor force growth, and (2) how productivity gains are distributed to the economy, chiefly as between prices and wages, the major component of prices.

Over the years ahead, as the economy grows, if we are able to avoid defense programs and recessions larger than those we have now, it seems to me we can look for a reasonably stable price situation in general. Under these conditions, it would not be surprising if there was a slight downward tilt to the wholesale price structure over the next 10-20 years. This is a possibility in view of rapidly increasing productivity per man-hour in recent years, such as followed World War I and the absence of conditions leading to the wage-price spiral. It would seem likely also, that such a price decline for industrial goods at wholesale would be considerably slower than the 1 percent or so per year in the 1922-29 period, with a larger share of productivity gains in the form of rising wage rates, reflecting the increased role of labor unions, which now cover a third of all wage earners compared with a tenth some 25 years ago. Prices to consumer, however, might not be affected significantly.

I am assuming also that government policies will be used to promote conditions of relatively full-employment—and that they will be used to offset inflationary tendencies as well as deflation. Since this is a declared objective, it would be unreasonable to assume otherwise. This in turn, enhances the prospect for relative price stability. If a trend toward world peace is established, these policies—in which credit and fiscal policies play an important part—would likely need to be directed more toward averting deflationary tendencies from time to time than to restrain inflation.

Impacts on Agriculture

In turning to agriculture, our major interest is in appraising its position under the economic conditions that are neither war conditions or depression. It is fairly clear that under war conditions, agricultural prices and incomes would respond to inflationary pressures much as in the past. But it should be noted that a slow persistent inflationary situation might well

act as much on farmers' costs as on their receipts from farm marketings with little net advantage to farmers. On the other hand, it seems clear also that if employment and incomes decline as much as they did in 1920-21 or 1929-32, farm prices and incomes would fall substantially further than they have to this point. But, assuming continued price support programs, they would not fall as much as in the earlier periods when temporarily, they were reduced by approximately 50 percent.

Keeping in mind that either of these alternatives is always a possibility, let us explore from the present base the nature of the race between food supplies and food demand, to borrow a phrase from Willard Cochrane. Although a considerable body of literature in this field has been developed over the past 6 or 7 years by some of the most respected names in agricultural economics, it is well to reappraise the long-term outlook from time to time, especially as our ideas on some basic trends such as population have been successively revised in recent years.[2]

In a context of continued high level employment, growing productivity and real income, and a reasonably stable price level in general, let us examine the impacts on agriculture over the next 20 years or so. But first it would be well to go back about the same number of years to the late 1920's when employment was also high to note the big physical changes that have occurred in the past quarter century.

From 1929 to 1953:

Population increased 31 percent.
Real income per person in the U. S. increased 47 percent.
Real income per person on farms from agriculture rose 56 percent.
Food consumption per person increased 12 percent.
Pounds of food consumed per person remained about the same.
Consumption of cotton per person increased 1 percent.
Consumption of tobacco per person increased 32 percent.
Volume of agricultural exports declined 13 percent in total, and 34 percent on a per capita basis.
Agricultural output, per capita rose 11 percent.
Parity ratio was 92 in both years.

These points can be made from the experience of the past 25 years:

1. Food consumption per person increased about one-fourth as much as real incomes. If allowance is made for the fact that food prices were higher

[2] "Significance of the General Price Level and Related Influences to American Agriculture"—3 papers by O. V. Wells, J. W. Tapp, and F. F. Hill—*This Journal*, November 1949; *Resources for Freedom*—Vol. V Report 7—J. D. Black, U. S. Govt. Printing Office 1952. *Economic Organization of Agriculture*—T. W. Schultz. "The Nature of the Race Between Food Supplies and Demand in the U.S. 1951-75"—W. W. Cochrane and H. C. Lampe—*This Journal*, May 1953.

relative to non-food prices in 1953 than in 1929, the increase in consumption would have been somewhat larger.

2. The increase in per capita food consumption reflected a shift from cereals, potatoes and beans toward more expensive foods, such as livestock products, which required substantially more agricultural resources for their production.

3. The parity ratio of 92 in 1953 while the same as in 1929, reflects considerable price support operations in the recent year.

4. To a large extent the imbalance between production and total disappearance in 1953 compared with 1929 was due to the failure of foreign markets to expand.

5. Real incomes per person in agriculture from farming rose about the same as per capita income for the population as a whole, even though there was probably continued disparity through most of the period between farm and nonfarm incomes. In the case of those in commercial farming, the gain in real income was probably somewhat greater.

Assumed Future Changes

Looking ahead to 1975, we have made the following assumptions:

Population will increase to about 210 million people, a gain of about 30 percent. This is about the percentage increase that occurred in the last 25 years. The population projection is approximately the mid-point of a set of projections made by the Census Bureau under varying assumptions of fertility and immigration. It should be noted that the high of these projections is about 220 million persons, which would represent a gain of about 37 percent from 1953 levels.

The labor force is assumed to rise slightly more than population reflecting the increase in the group 14 years and over projected by the Census Bureau. The labor force participation rate of this group is assumed to continue about at the stable rate of recent years.

Unemployment is assumed at 5 percent of the labor force—about the current rate. Employment would rise about a third from 1953 levels. It is also assumed that the work week would continue its long-term decline—perhaps by 9 or 10 percent from 1953 levels.

Productivity per man-hour is assumed to rise about in line with the long-term trend of about 2½ percent a year. This may also be conservative considering continuing heavy investment in plant and equipment that has characterized the postwar period.

The sum total of these assumptions would yield an economy in 1975 roughly double the size of the present economy—and real incomes per person approximately two-thirds higher. This compares with an increase in per capita real income from 1929 to 1953 of somewhat less than 50 percent.

Impact of these Changes

To measure the impact of such large increases both in population and in income on the demand for food, it is necessary to make allowance for a declining income elasticity for food, as an aggregate, over time. This is a logical development in as much as increases in purchasing power tend to be channeled more and more into non-agricultural products and services as the economy grows. This is not to say that expenditures for food might not rise substantially along with incomes, but the demand for the services attached to food is likely to be considerably more responsive to income than the value of the raw products at the farm.

By and large, the declining income elasticity for food is not a controversial issue. There is support from the Engel curves of food expenditures to family income which show a flattening tendency at the higher income levels. The tremendous increase in income projected by 1975 would mean that the proportion of families with incomes over $5,000, assuming no price change, would double and make up some 60 percent of the total. This would put most families at income levels which now show relatively little change in food consumption patterns in response to income changes. Furthermore, Faith Clark and her colleagues in the BHNHE have developed materials showing that the income elasticity for meat, one of the most responsive foods to income changes, was one-third smaller in the spring of 1948 than in the spring of 1942, after adjusting for size of family and region. It is possible that the relatively low elasticity of 1948 was due partly to the use of liquid assets by low income families to maintain food consumption patterns developed during war years despite relatively high food prices in 1948. The existence of large holdings of liquid assets tends to reduce price and income elasticity of most goods and services.

It seems not unreasonable that by 1975, the income elasticity for food as an aggregate might be nearer a sixth than the fourth which is roughly our present experience. This would mean an increase of about 10 percent in per capita food consumption over the next 20-25 years. The redistribution of income alone assuming no change in consumption patterns at each income level would yield an increase of over 5 percent in average food consumption. Together with population growth, total food requirements for domestic use would rise some 45 percent from 1953 to 1975. It is also likely that the domestic market for the important non-foods will also rise. For cotton the increase may not be as much as for food. Synthetic fibers may continue to make larger increases. For tobacco a further substantial increase is likely unless the health problem becomes more acute.

As in the previous period, the per-capita consumption of food in pounds may be expected to change little, despite Joe Davis' recent persuasive

article on the expansive potential of the human stomach.[3] The increase again would largely reflect trends toward substantially larger consumption per person for poultry and fruits by about a sixth, for meat, eggs and vegetables by about a tenth, and for fluid milk and cream by about 5 percent. There would likely be smaller consumption per person of cereals (perhaps less than 5 percent), and of dry beans and potatoes by about a sixth or seventh. There would be little change in per-capita consumption of fats, in total. It should be noted that part of the increase noted represents shifts toward more processing such as frozen orange juice. This somewhat overstates the case in terms of requirements at the farm.

Probably the greatest chance for error on the demand side is in appraising the export potential for United States farm products. Trade restrictions, price disadvantage, and until very recently, severe dollar shortages abroad, have all operated adversely on our ability to export farm products. The total volume of agricultural products exported in 1953 was slightly under that in 1929. On the basis of past trends, one is justified only in assuming that our total farm exports would not be much different over the years ahead, perhaps somewhat lower. Yet, on the basis of recent developments, including new programs to stimulate exports and to meet competitive prices, as well as a distinct trend abroad towards the easing of trade restrictions, we might also be justified in projecting some increase in exports. Even so, with exports accounting for only about 7 percent of our current level of production, any increase projected on economic grounds alone would have little impact on the over-all demand situation.

It is only when we consider the political implications of the differences in levels of living between the U. S. and other countries that tremendous increases in demand seem possible. A recent study of The Organization for European Economic Cooperation shows tremendous differentials between the consumption levels of the United States and Western-European countries.[4] In 1950, per capita consumption of all goods and services in the United Kingdom was only two-thirds that of the U. S.; in France slightly over one-half as large; in Germany under one-half and in Italy less than one-third of the consumption level in the U. S. While differences in total food consumption between the U. S. and Western European countries are probably not as great as for the total level of living, they are very substantial for animal protein and for fats. Considering that levels of living on most other continents are even substantially lower than in Western Europe, the gap between the U. S. and those abroad represents a serious

[3] "Adam Smith and the Human Stomach." *Quarterly Journal of Economics*, May, 1954.

[4] *An International Comparison of National Products*, Gilbert and Kravis, OEEC, Paris, 1954.

political problem in the conflict of ideas between East and West. Out of such circumstances, a much greater demand may well develop for certain U. S. farm products, such as fats, even though food grains might not be affected appreciably. In this connection, the large requirements for protein feed in this country to support expansion of the livestock enterprise will yield a very substantial excess of edible oils over domestic requirements. The very low levels of consumption of fats and oils in most foreign countries indicate the possibility of very substantial increases in our exports of such products.

While demands in total, domestic and foreign, might rise some 40 percent over the next 20 years or so, it should be noted that approximately 8 percent of 1953 production was in excess of requirements at 1953 prices and went largely into CCC stocks. In net terms, therefore, an increase of about 30 percent in agricultural production by 1975 from 1953 levels would be necesary to meet prospective demands as we have shaped them at roughly 1953 price relationships. On its face, this does not appear to be difficult to attain. It is approximately the amount of increase in agricultural production which has occurred in the last 13 years, although, under price and weather conditions and levels of investment in agriculture generally more favorable than we might reasonably expect for the future. If the rate of production increases from now on approximates the annual increase of about 1¼ percent during the 1922-29 period, when price relationships were roughly the same as in the last few years, farm output by 1975 would be close to 30 percent higher and a rough balance between demand and supply attained without altering price relationships overall.

Agricultural Supplies will be Ample

Keeping in mind that recent technological advances in agriculture are continuing—especially the increasing use of high nitrogen and antibiotics—there seems little reason to doubt that the potential increase in production, under present price conditions, will be sufficient to meet projected requirements. Nevertheless, we should also keep in mind that American agriculture will become largely a feed-livestock economy. While the necessary increases in crop yields appear to be easily attainable, productivity gains in livestock and livestock products have generally lagged behind those for other agricultural products. It should further be noted that if we have been too conservative in judging population and income trends, requirements might well be 5 percent or so higher. No one can foretell with any degree of accuracy the conditions of demand and supply for farm products which might develop by 1975, keeping in mind Schumpeter's warning about external factors. For agriculture only a few percentage points of difference mean a great deal. The low income elasticity for food and the prob-

ability that it will decline further, indicates that as the economy grows, agricultural prices might be subject to even greater fluctuations, up and down, by small changes in supplies than heretofore.

This points up the necessity for constant surveillance in this field. We can be assured that agriculture's position in a growing economy will be better than in a stable or declining economy. But, we are not likely to eat our way into rising prices for agriculture in a peacetime world. This is not to say that farm incomes might not be satisfactory. That depends on the efficiency of production as well as the level of prices and the volume of marketings. Further, because weather and yields vary greatly there will continue to be need for farm programs designed to maintain some stability in agricultural supplies if farm prices are to avoid sharp declines from time to time.

I have mentioned earlier that despite differences in levels between farm and nonfarm incomes, real incomes per capita of farm people from agriculture have tended to keep pace roughly with increasing real income in the nation at large. If agriculture is to produce some 30 percent or so more products by 1975, agriculture's gross income would increase by approximately the same amount, if prices hold relatively steady. On the other hand, costs per unit of output have risen very substantially especially in the last 15 years. Unless a reversal of this trend of increasing purchased inputs for the same amount of output occurs through some major cost reduction, net income in agriculture in total would increase at best by 30 percent by 1975 and perhaps less. In order for farm operators to match the two-thirds increase in real incomes per person projected for the economy as a whole, there would need to be a reduction of perhaps a fifth or more in the number of farms by that time.

With respect to the shorter-term, it should be noted that over the next 6 or 7 years we shall face much smaller increases in population and income growth. By 1960, these may bring a 16 percent increase in consumption of farm products, if foreign takings continue much as is. Considering the large stocks accumulated from 1953 production, it would require only a little more than a 5 percent increase in production from 1953 levels to equal the consumption requirements in 1960, even if further stock increases are avoided.

These are the potentialities over the years ahead as prescribed by assumptions of high-employment, population and income growth, and peace. There is some risk in each of these assumptions.

DISCUSSION FROM THE STANDPOINT OF FARM SUPPLIERS

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I shall take as my text for this discussion the following statement from Mr. Koffsky's paper: "We are not likely to eat our way into rising prices for agriculture in a peacetime world." This is his summary appraisal of the long term outlook for the period up to 1975. His view of near term prospects is equally conservative. Again, let me quote: "It would require only a little more than a 5-percent increase in production from 1953 levels to equal the consumption requirement in 1960, even if further stock increases are avoided." These are his conclusions despite optimistic assumptions concerning population increase, high employment, general growth in the economy and real incomes per capita by 1975 about two-thirds higher than 1953. I shall comment briefly on "the external factors" which may modify those prospects, but mostly I want to discuss the impact of such prospects on farmers, and the implications for redirection of research, educational and other programs.

The assumptions on which these conclusions are based are clearly stated and the paper represents a well documented appraisal of prospects under the specified conditions. The closing sentence in the paper is worth repeating: "There is some risk in each of these assumptions." I think we all recognize the wide margin for error in projections of this type. We have experienced such rapid changes in the market for farm products during the last quarter century that we should not be surprised if external factors again upset the results of the very best projections that can be made. This is not to say that we should avoid making them. After all, economic decisions concerning the future have to be made by farmers and others concerned with agriculture. We, therefore, have a responsibility for the best possible appraisal of future prospects.

The assumptions in this paper are well hedged concerning possible upsets from international emergencies or drastic changes in the export picture. The probable impact of serious drought is not so clearly stated. Growing conditions have been favorable in most years since 1940. What would happen if we should run into a drought cycle? Crop production per acre in 1930-34 averaged 10 percent lower than in 1925-29. The drought would not have to be as serious as the 1930's to upset calculations considerably. Another corn year such as 1947 could relieve us of the entire feed surplus that seems to worry us so much at the present time.

Koffsky's estimate of market expansion by 1960 seems rather low.[1] But taking his estimated 5 percent increase, we need to consider how rapidly farm output is likely to expand under conditions characterized by a cost-price squeeze (assuming average weather). Will farmers be disposed to undertake new investments that involve heavy capital outlay? If not, will there be a slowing down in output expansion? What about the possibility of increasing output by stepping up variable expenses; for example, using more commercial fertilizer?

We need further analyses on these points. My own tentative opinion is that farmers are likely to increase both their capital investments and their current expenses for production increasing improvements, if they are convinced that

[1] See "Needed Adjustments in Farming," by R. P. Christensen, *This Journal*, August, 1954.

these expenditures will pay out under prevailing price prospects. Although reasoning by analogy is dangerous because conditions are never similar in all respects, it might be helpful to look at the experience in the 1920's. Despite relatively unfavorable cost-price relationships, farmers did increase output 7 percent from the average of the years 1922-23 to 1928-29. At that time they broke out new land in the Great Plains and purchased tractors and associated equipment to replace animal power. The latter shift released about 12 million acres of cropland. In other words, they did adopt available improvements that required capital outlay. It is much easier to step up improvements, such as more fertilizer, which are covered in operating expenses.

What are the implications for research, education and operations programs? *All of these activities can function either to alleviate pressure of supplies on markets or to increase that pressure.* Unless there is careful planning and preventive action is taken, all of these activities might accelerate the pressure of supplies on limited markets. The result would be lower incomes to farmers.

Let me illustrate some of the dangers. Research programs have emphasized production increasing improvements with relatively little effort devoted to ways of achieving production balance, and of discovering possibilities of reducing costs without increasing output. Extension programs have concentrated on adoption of single practices that tended to increase total output with little attention given to production balance. Although Soil Conservation and ACP programs have emphasized resource protection, many of the recommended practices result in rather immediate increases in output. Even control programs based on acreage rather than production restrictions tend to increase output per acre of a restricted crop in order to offset the effect of reduced acreage, and since something else is grown on the acres diverted, the net effect may well be a larger total output.

Lest these remarks and those that follow be misunderstood, let me hasten to say that over a period of years these activities have rendered immeasurable service to agriculture and to the general welfare. One needs only to recall the rapid increase in output during the war emergency to recognize the value of production increasing activities when the demand for farm products is expanding. And research must be undertaken today in order to meet tomorrow's needs. I should also add that as a nation we must not relax our efforts to build an efficient agriculture, including protection of our resource base. But question: Is there need now for redirection in view of future prospects? Redirection that will reduce the pressure for immediate increases in output and build up *reserve capacity* for expansion geared to the gradual growth of the market?

Alternative roads are available. For example, in our expanded extension program, we could continue to emphasize improvements which will increase output and give relatively little attention to production balance and ways of reducing costs without increasing output. On the other hand, in counseling with individual farmers, extension workers can help them to analyze adjustment possibilities. Some farm families own their farms and equipment free of debt and now hire considerable labor to work their farms at a high level of capacity. Perhaps many such families can afford to reduce the pressure, put more land in grass, and dispense with hired labor. In that way they would shift to low pressure farming and would build up reserve capacity to be utilized in periods when income prospects are somewhat brighter. Such

adjustments are likely to appeal to farm families in the older age groups who can afford to take some reduction in income in order to lessen work and worry. Then there are the younger families located on farms too small or too unproductive to provide an adequate living. Should some of these families be encouraged to seek other occupations, or perhaps part-time employment, and what are the possibilities of encouraging farm consolidation in such areas? Those who remain in farming would then have more adequate land resources. The hopeful aspect of this problem is the rapid industrialization that is going on, especially in the Southern States. Nearby non-farm employment is likely to be available in a growing economy.

In the Midwest, fortunately, many alternative shifts are possible. The question is largely one of achieving production balance in view of market prospects and of seeking ways to reduce costs without increasing output. This is likely to mean more hay and pasture, more emphasis on roughage livestock and adoption of cost reducing practices in feed and livestock production.

The toughest problem is likely to be faced in the Great Plains and the Pacific Northwest wheat areas because of the bearish long time outlook for wheat. The grazing-livestock alternative on some of the high risk, low yield, wheat land will mean larger farms and fewer farmers. This change will not be easy, but surely we should not continue to produce wheat that cannot find a market on land that is unsuited for crop farming. Here is a problem that deserves top priority in research, extension, conservation, and other programs.

These are my tentative hypotheses concerning some impacts of the prospects outlined by Mr. Koffsky. The hypotheses need to be tested by research and the research results geared into the expanded extension program and the Soil Conservation, ACP, and other programs. This will require retooling of all of our agricultural activities to fit the needs of tomorrow. Will researchers do their part of this job?

DISCUSSION OF THE DEMAND SIDE

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The subject "Long-Term Price Outlook and its Impacts on American Agriculture" is one that deserves our serious attention—more than can be given in a meeting of this kind. Our discipline has an important responsibility in this area, especially if we think of the decisions that agricultural business managers have to make as they attempt to gain control over fixed assets. But first of all, we need a theory—a theory of economic development. Look back into the writings on this subject and you will find no consistent body of theory either implicitly or explicitly employed in the reports of empirical findings. This is serious. I cannot find fault with Mr. Koffsky's ground rules. All fair games have rules and there is no good reason to exclude the game we are playing. But few games can be played with *ground* rules alone. A more complete set of rules is needed and it appears that rules do not exist for long-term forecasting. If the economist is to make a unique and positive contribution in this area, it will come from his ability to generate and apply methods which will allow him to proceed from a given set of circumstances to the final result.

At this point a question could be raised as to how far forecasts should be disaggregated. To do a thorough job we must eventually analyze the impacts on the agricultural firm as well as on the industry. Current time and space limitations prevent any probing beneath the aggregates. It should be recognized that there are some events which are classified as uncertain in the particular yet can be treated as risk situations in the aggregate. For example, the National Safety Council does a reasonably good job of forecasting the aggregate number of tragedies that will occur on busy holiday weekends, yet it cannot forecast whether you or I as individuals will be involved. This fact, that in the aggregate selected outcomes can be treated as risk situations, allows us to frame our projections in a probability setting and can prove to be quite useful in application.

I have one further general comment. I doubt whether we as economists have any right to allow historical extrapolations to dictate empirical probabilities for the future. We err inexcusably by projecting trends or cycles of generated aggregates in this fashion. History's major contribution, to my mind, is made by providing data and experience so that certain structural relations that are useful in forecasting can be specified. Even a tabulation of the frequency of directional movements can be tremendously misleading.

There are a few specific points in Koffsky's paper which I would like to comment upon briefly. First of all, I think it is an overgeneralization to say that short-lived price situations are more vulnerable to instability than price situations which have prevailed for a considerable period of years. I would advance an hypothesis that the longer that periods of maladjustment persist, the more vulnerable is any given price situation to *forces* of instability. At this point I would yield to historical analogy for evidence of the existence of such periods. Secondly, Koffsky's point that the long-term price outlook depends largely on how well the level of employment is maintained in relation to future population and labor force *growth* might at this point better be stated in terms of the productivity of labor as well. Furthermore, the distribution of productivity gains to the economy through wages is important, but over the long-run the returns to investment in capital equipment and land may also prove to be quite important.

In my opinion the effects of price support programs to date have been somewhat overrated. For particular products, accrued benefits have been fairly substantial; in the aggregate, however, substantial and lasting price effects have not been convincingly demonstrated.[1] In fact, some have argued that output has actually increased with price supports over their period of operation. With the low price elasticity of demand and assuming that the added output was not effectively isolated from the market, this would result in a reduction in the level of farm prices.[2]

I have also had some difficulty in my own mind of resolving the consistency of the phenomena of continued high level employment, growing productivity and real income with a reasonably stable price level in general. Not that it could not result from these conditions, but within the framework of Koffsky's

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[1] Cf. M. R. Benedict, "Farm Prices and Farm Incomes." *American Economic Review*, XLIV No. 2, May, 1954, p. 101.

[2] Cf. D. Gale Johnson, "Competition in Agriculture: Fact or Fiction." *American Economic Review*, XLIV No. 2, May, 1954, p. 109.

analysis the outcome of stable general price level does not seem to follow from the stated changes in the explanatory variables.

Some Positive Suggestions

Let me now get somewhat more positive. The remarks that follow will be more a synthesis rather than an analysis of relevant relations, for reasons pointed out earlier. Over the long pull the two most important explanatory variables are population and real and monetary disposable income, both of which are affected by relevant international forces. I personally prefer to talk in monetary as well as real terms.[3] With respect to this, I am not willing to concede that two parity ratios of 92 at different price levels have the same impacts upon agriculture, especially when they occur at widely separated points in time. Actual prices introduce the important interplay of supplies and demands for money (or liquidity) versus goods.

First, let us take a relook at population. It is well known that demographers have encountered difficulties in forecasting either the total, the composition or the geographic and age distribution of domestic population. The record has not been much better, and in most cases it has been worse, outside of the United States. The Census Bureau's quarter century forecasts of a year ago which Koffsky referred to varied more than 10 percent from low to high based upon varying though plausible assumptions. Even with these limitations the Bureau was careful to point out that their highest and lowest projections were not intended to define the range of reasonable probability. A figure somewhat near their upper limit of 221 millions would seem to be more appropriate by 1975. This would represent an average annual growth of about 1½ percent per year. The composition of the population as between civilian and military could differ greatly from today's division, however, I will assume that it will not.

In comparing the structural influence of population on the demand for agricultural products for the future, the age and family composition may be quite important. It is significant to note that families are becoming larger, as indicated by a recent report revealing the tremendous increase in the number of families having a third and fourth child.

A second significant point is the trend towards urbanization. Evidence at hand points to the fact that nearly all of the future increase in population will be taken up in urban centers.

In our type of economy—i.e. one where there is little pressure of the populations against the food supply—total population is difficult to forecast. Since a knowledge of other disciplines is needed to forecast this variable, I am inclined to do as Koffsky does and merely assume that the total domestic population by 1975 will approximate 220 million people, and that its composition in terms of changes from the present will make it a more important economic variable over the next 20 years than it has been in the past. The domestic demand effects of changing foreign populations will be reflected in my consideration of the trend in net exports at a later stage. On balance, my guess is that population changes between now and 1975 will increase the demand for food at least 40 percent.

[3] For an interesting recent discussion of reasons for using actual prices, *cf.* L. Hough, "The Price Level in Macroeconomic Models." *American Economic Review*, XLIV No. 3, June, 1954, pp. 269 ff.

Expenditures for Farm Products

Turning to considerations of income, I can agree that the income elasticity of farm products declines as real income levels rise, though at a decreasing rate. Within the relations formulated by Koffsky and because of the opportunity that exists to substitute those classes of foods which have a high income elasticity for those which have a low or negative income elasticity I am inclined to think that the reduction in the aggregate income elasticity to approximately one-sixth may be a little too great.[4]

Looking more closely at what is likely to happen to total disposable income, it would appear that high expenditures by the United States Government combined with continued public pressures for low taxes would result in a continuation of moderate government deficits. It is probable that government monetary and fiscal policies would be pointed toward giving about the same net effects even though outside uncertain events, such as minor hot wars, changes in political attitudes or our world-wide responsibilities occur. In this kind of environment, continued economic growth to the extent that total disposable incomes could more than double in the next 20 years seems plausible.

The effect of rising incomes on the price elasticity of demand is extremely important. If incomes follow this pattern of growth, the demand for food will become more inelastic, perhaps declining to half its present value. Changes in output will lead to greater instability in farm prices and the need for control programs to mitigate these fluctuations will be greater.

I frankly feel at a loss as to how to formulate the future course for international trade. Perhaps a few general statements will be of some value. I cannot ascribe to this variable the importance that Koffsky does, yet under certain situations its influence could be major. First of all, I share the belief with many of you about the countries of the world whose populations now are forced to spend a high proportion of their income for food. I doubt whether we can regard them as substantial bidders in our markets in the future. Foreign aid programs carrying heavy domestic subsidy will undoubtedly be necessary for such countries to be of significant importance. In other areas, potential demand is nearly as difficult to quantify as it is in the United States. Adding to this the international political picture and the more intricate trading machinery in the international sphere, I am led to agree with Koffsky's conclusion that we had best assume that a moderate increase in exports is most likely. Agriculture has had to adjust to an abrupt decline in exports in recent years and a mere discontinuance of this trend relieves some of the downward pressures on domestic prices.

In this setting—i.e. one with rising population, expanding disposable income, and stable or slightly rising exports—the environment for agriculture created on the demand side should be healthy. The future course of prices will become more dependent on the behaviour of supply. As a nation we are politically committed to a policy of full employment and this is difficult to maintain without at least a moderately rising price level. From a political point of view it is also better to err towards the inflation rather than the deflation side. I shall not strive at this time for more precision in terms of pre-

[4] The transfer of human resources out of agriculture where the income elasticity is now very low will mitigate this trend.

diction, but merely call your attention to a note in This Journal[5] where I committed some of the same errors for which I am now criticising Koffsky and others. But let me state again a belief that our profession has something unique in this area to offer to those making decisions in agriculture. Through proper use of the tools at our disposal and the development of new ones within our discipline, I am confident that our worth in this area can be properly demonstrated in the years ahead.

[5] J. Nielson, "Long Run Price Forecasts in Farm Planning," *This Journal*, XXXV No. 4, November, 1953, pp. 617-20.

IMPROVING AGRICULTURAL ECONOMICS IN THE DECADE AHEAD

Chairman: M. E. John, Pennsylvania State University

MISTAKES AND LESSONS IN AGRICULTURAL ECONOMICS IN THE LAST 25 YEARS

O. C. Stine

I WAS asked to draw from the record of the last 25 years lessons for improving agricultural economics in the decade ahead. I could point to great progress in research, in teaching, in extension, and in the development of national economic policies and programs. But I was asked to talk about *mistakes* and lessons learned. Obviously time does not permit the detailing at length of mistakes throughout the field. I have chosen to devote the time allotted to me primarily to mistakes in the application of economics in the development and operation of national policies and programs.

My hypothesis is that the *individual and private use* of economic resources must be modified in the interest of the social group or nation with increasing specialization of production and increasing demands upon resources; and that a democratic government aids in cooperation or in coordination of producers in using resources more efficiently to satisfy the wants of the nation.

Let me present a brief formulation of *national* economic objectives of agricultural policies and programs:

1. *To produce at minimum cost* what the nation wants *most* from agriculture more than other goods and services.
2. *To conserve agricultural resources,* including farmers.
3. *To provide for the farmers needed* in the agricultural occupations *income sufficient* to enable them and their families to share equally with others opportunities for living in the community.

I assume that it is an appropriate responsibility of the government to assist in achieving these objectives.

I concur in the proposition that the individual farm enterprise, the family farm, should be preserved as an efficient economic institution. But the degree of freedom in operations must adjust to the requirements of cooperation or coordination for greater economic efficiency in the use of resources for today and tomorrow. This formulation of objectives assumes a *national* economic interest in preserving and further developing farm skills and leadership as well as farm lands. In connection with the recent wars we have realized the great national importance of the skills and re-

sourcefulness of farmers in meeting national emergency requirements from agriculture. However, the national interest *in a balanced economy requires* that the government exercise powers to encourage adjustments in number of farm operators in line with requirements for efficient production of *agricultural goods and services needed more than other goods and services.*

Delay in Formulating Effective Government Measures

I consider the attitudes of many economists toward proposals for farm relief through government action after the depression of 1921 to have been a great professional mistake. While some economists made significant contributions toward dealing with problems by economic analysis and suggestions, some influential leaders stood by primarily to criticize. The critics probably contributed to delay in the formulation and adoption of effective government measures. However, by 1929 some non-agricultural economists had begun to line up with those in agriculture who considered some action by the government necessary in the interest of farmers and of a better balanced economy.

A new pattern for Farm Economics was outlined by Dr. H. C. Taylor in 1929.[1] He said that he had materially changed his views since the American Farm Economic Association had been organized in 1919. His farm economic philosophy *had* "centered about ways and means of acquiring landownership on the part of farmers as a basis of independence." But the chronic depression of 1921 had shaken the faith of many and *"the basis of farmer's welfare and independence is no longer landownership but income."* He recognized that the farm economist had the problem of occupational distribution of income (wealth) thrust upon him. Would "he continue to think entirely in terms of internal economics when external agricultural economics is determining to such a large extent the farmer's well-being"?

Taylor recognized the great value of the economic information services, including the outlook reports. But in view of conditions beyond the control of individual farmers, he also recognized that the problem of adjusting supply to demand could be only partially solved by their decisions. The most definite statements in the direction of anticipating direct government intervention in marketing surpluses were: "In due course of time, when a period of clear thinking coincides with a period of national statesmanship, an institution for the handling of the climatic surpluses of farm products will be established in the interest of both producers and consumers" (p. 364). In this connection he overlooked the problem of securing the coordination of individual farmers in adjusting production.

[1] "The New Economics," *This Journal*, July 1929, p. 357-367.

The most significant statement in Taylor's outline of work to be done reads: *"With facilities for the adjustment of production and marketing to the demand, excessive competition of farmer with farmer may still leave farmers with comparatively low pay for their labors. The key to the solution of this phase of the farm economic problem lies in the teaching of farmers to insist upon as high a standard of life as that enjoyed by their city cousins."* He asserted that agencies which tend to hold an excess of farmers on the land should be displaced by those which would facilitate the movement of the surplus into other occupations, and that national economic legislation should be carefully scrutinized and modified to the extent necessary to balance opportunities in agriculture with those in other occupations. He asserted that farmers should act in their own interests, that those that remain on the farm must think and act together. Farm Economists should lead in clear thinking. They should eradicate false theories and construct theories that correspond to the facts. He suggested also that the forces that determine the farmers share in the national income be given the central position in our farm economy, and that when this is done efficient production and marketing will fall into their proper relationships.

However, the long shadow of the classical economic insistence upon freedom of individual enterprise and resistance to government intervention continued to be a strong influence upon the writings and actions of some agricultural economists.

Developments in terms of the change in concept of Agricultural Adjustments were discussed by Dr. E. G. Nourse in 1936.[2] He noted that previously chronic difficulties of adjustment had been met by freedom of economic enterprise and education. But the postwar adjustment problems were so great that education, including outlook, was inadequate to deal with the situation. The new concept included government intervention in modifying income and in influencing families. Nourse noted that the fundamental significance of the new concept was that it shifted the theatre of decision from the farmer to a central planning agency with powers to allocate agricultural income. He, however, did not approve of the shift. He believed that educational devices might be more effective than a system of pecuniary rewards and sanctions. He represented the views of many leading economists, and these views have persisted.

The persistence of the emphasis upon freedom in production and marketing is recorded in the recent farm policy review by several leading agricultural economists.[3] In the recommendations with reference to production control, it is emphasized that the *"Final decision should rest with*

[2] *This Journal*, May, 1936, pp. 254-255.
[3] *Turning the Searchlight on Farm Policy*, The Farm Foundation, 1952.

the individual farmers." Further it is stated that "*Reliance on the free market–should give the farmer adequate returns from the market and give the country an adequate supply of farm produced commodities at reasonable prices*" (p. 67).

Why then do farmers vote to accept quotas and enter into marketing agreements subject to government orders? Apparently many farmers have learned from experience that competition under government supervision has improved their position in the national economy. And today the nation has more than an adequate supply of many products at reasonable prices.

I have been pleased to see in recent issues of *The Journal* more realistic reflections by agricultural economists on the freedom of enterprise. Ervin Long, in the August number of 1953, examined the proposition that "collective action *always* restricts individual freedom." He cites evidence that it does not, and concludes that meaningful analysis requires appraisals of alternative courses of action. Hathaway in the November issue calls attention to alternative choices in farm operations in relation to income results and marginal values. Farmers may be quite willing and economically justified in the sacrifice of some degrees of freedom in operation for the prospect of higher income from and alternative course of action. Freedom from want *is preferable* to freedom to plant more acres.

External Conditions

I now turn to mistakes and lessons learned in appraising and dealing with national economic conditions which affect agriculture, but which are mostly if not entirely, external to the *individual* economy.

Population and Natural Resources

In my view one of the most significant mistakes by some agricultural economists has been the acceptance of the assumption that in a short time the pressure of the growth of population upon the natural agricultural resources would solve the farm problem. I remember when the common appraisal of the national situation was that all the fertile frontier had been occupied. It was assumed that agricultural resources of the nation had reached the point of diminishing returns. Consequently the requirements of the increasing population would extend the margins of cultivation. Therefore, in time the prices of agricultural products would be forced up in relation to the prices of other products.

The validity of the assumption was being challenged by developments after the first World War. By 1929 it had begun to appear that technological improvements in the use of land and other resources were pushing agricultural production along many lines ahead of the growth of population.

The attempts to cut back production by retiring submarginal lands and by acreage restrictions on commercial farms in the 30's were also practically nullified by more intense culture and technical improvements. Brewster spelled out the lesson learned as to the significance of technological improvements in production through the second World War in August 1945.

He wrote that during the quarter century ending in 1945 "the rate of gain of productivity of farm workers overtook the rate of population growth, so that the age old pressure of population upon the food supply *changed skins* and became the pressure of food supply upon the population."[4] Cochrane and Lampe[5] extended the analysis of the significance of technology in the race between agricultural supplies and requirements into the future. They concluded that *"the current concern over the possible shortage for the long run in the United States is unfounded."*

Mistakes have been made in assumptions as to the growth of population and the natural resource limits. I remember quite well when arguments for the retirement of submarginal lands were strongly supported by an assumption that the declining rate of growth indicated that shortly the population of the nation would become stationary. The upsurge in growth in recent years has encouraged some to advocate holding the present level, for in a short time it would be necessary to fill the "fifth" plate. Previous experience suggests that the presentation of the fifth plate might be delayed by changing conditions, and that there might be more than enough to fill it when it is presented.

Assumptions as to the limitations of the original qualities of the natural resources have overlooked important dynamic factors in the economic productivity of land and water. It is obvious that changes in the distribution of population and in the wants of consumers, as well as technological improvements in the use of the original resources, continually modify the margins of productivity of the agricultural resources. The lesson for those who are willing to relax their preconceptions inherited from the classical economists is spelled out by Dr. T. W. Schultz in a chapter on "The Declining Importance of Land" in his *Economic Organization of Agriculture.*[6] He concludes "that the economic developments that have characterized Western communities since Ricardo's time have resulted in improved production possibilities and in a community choice that has relaxed the niggardliness of nature."[7]

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[4] *This Journal,* "Farm Technological Advance and Total Population Growth," August, 1945, p. 509.

[5] "The Nature of the Race Between Food Supplies and Demand in the United States, 1951-75," *This Journal,* May, 1953.

[6] *Economic Organization of Agriculture,* McGraw-Hill Book Co., pp. 128-245.

[7] *Ibid,* p. 139.

Foreign Trade

Some economists have held to the faith that free trade would solve many of the problems of agriculture. The assumption is that the foreign market could serve as a shock absorber for surpluses. In fact it seems implicitly assumed that the foreign market demand is very elastic and expansible. But foreign countries generally and for various reasons are not willing to accept indefinite quantities of farm products from the United States. While they want open markets in the United States, they want to choose what they take in exchange. Even the reciprocal trade bargainings have failed to loosen up trade to a very significant extent.

The obvious lesson from foreign trade experience before the war was that foreign markets were less dependable than domestic markets. Economic depression in foreign countries not only lessened their buying power, but also led to the increased protection of domestic producers and exchange restrictions to protect currencies. Colonial preferences and interest in self sufficiency also became important factors in stimulating production abroad, and limiting imports from the United States. War conditions re-opened markets but postwar recovery is reducing interest in our surpluses. Foreign producers now consider the maintenance of production in the United States by high level price supports and subsidized exports unfair competition. They also want stable markets. One practical approach to dealing with international trade in farm products is through coordination of the national and international programs of cooperating countries. Comparative advantage may be recognized as an important factor in the terms of international arrangements but other national objectives must also be recognized. Each country must take into account the desires of agricultural producers for greater economic stability.[8]

General Price Level

The influence of changes in the general price level upon agricultural prices has been recognized, but economists have differed as to the primary causes of changes, and effective methods of dealing with them.

Twenty-five years ago one influential school considered the supply of gold the dominant factor in determining the price level. The experiment with government action to raise prices through devaluing the gold dollar in 1933 had only a temporary effect upon the prices of commodities involved in international exchange. Other economists considered credit conditions and governmental fiscal policy more potent than changing the value of gold. The restoration of confidence in the banking system, ex-

[8] *See* "Positive Proposals" by D. Gale Johnson in *Trade and Agriculture*, John Wiley and Sons, p. 161.

tending credit facilities, and expanding government expenditures by borrowings all contributed in 1933 toward raising the general price level from the depth of the depression. However, the progress was slow until the outbreak of war in Europe.

The lesson learned by experience in trying to adjust the general price level is that effective means depend upon the general condition of the national economy. As a rule no one device can be depended upon for sustained results.

Agriculture and Business Relations

Since there is a high degree of correlation between the income of industrial workers and the cash receipts from the marketing of farm products, it is evident that the demand for farm products is closely related to the income of industrial workers. Twenty-five years ago some farm economists emphasized the reverse relationship—that the income of industrial workers was primarily determined by agricultural prices and income. While the public support for government expenditures to raise agricultural prices and income from the low levels of the depression was certainly justified on this ground, it did not follow that the entire industrial economy could be lifted by agriculture alone. The declining importance of the share of agriculture in the national economy pointed to the necessity of other measures for recovery. Substantial recovery was achieved, but the continuation of unemployment for a large number of those seeking work until after the outbreak of the second war in Europe indicated partial failure of the government efforts to lift the national economy from the depression by aids to agriculture and to industry.

What lessons are to be taken from these experiences? Too much government interference with private business? The wrong methods? Not enough at the right time? Or lack of balance among the segments of the national economy?

Government responsibility for trying to maintain a high level of employment in industry and in the whole economy was accepted in the Employment Act of 1946. Some economists have faith that the government can maintain a high level of employment. I quote from Calvin Hoover and B. U. Ratchford in their report on *Economic Resources of the South:* "The crude measures by which economic depressions can be prevented and a high level of purchasing power for the products of industry maintained are now well known. The danger that the federal government will not take the right measures soon enough to prevent an economic depression, does indeed still exist" (p. 391). The real test of the *know how,* and of the means remain to be made in the forthcoming

readjustments to a peace time economy. In conclusion, I believe that the prewar experience suggests doubt as to the *know how* as well as to the timing of necessary action. However, the experiment with whatever means *appear to be appropriate* should be continued even though perfection may still be doubtful.

Terms of Trade

The terms of trade between agriculture and other segments of the national economy are very significant in determining the economic position of the farmer. It is commonly observed that the individual farmer has no significant bargaining power in selling his products or in buying his goods and services for use on the farm. Increasing dependence upon other segments of the economy for goods and services used on the farm, and increasing specialization in production for market weakens the bargaining position of the farmer. The lack of control over supply, the perishability of products, and the inelasticity of demand *result in great variations* in the prices received, while the prices paid, being generally subject to control through administration action, collective bargaining, and public regulation remain relatively stable. This is most significant in a business depression, or when the general price level is declining.

In view of the imperfect competition, or monopolistic pricing in the other segments of the economy, and the increasing dependence of the farmer on the market, I consider it a mistake for agricultural economists to continue to urge the maintenance of unlimited competition in agricultural production and marketing. They should recognize the fact that unlimited competition in agriculture tends to prevent farmers from sharing in technological improvements in production, and leaves them defenseless against increased competition from the backflow of surplus labor from industrial unemployment. The government supports labor in bargaining for a share of increased productivity. Why not support the farmer?

Group action through cooperatives, and government aid through marketing agreements and orders, or production and marketing controls simply contribute to improving the terms of exchange for the farmer. Call it what you will. Follow Galbraith in calling it "countervailing power"[9] or Calvin Hoover "organizational economy."[10]

Controls Contribute to Efficiency and Conservation: But the challenge to the assumption of the superior merits of unlimited competition does not rest entirely upon the need for improving the bargaining power of

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[9] John K. Galbraith, *American Captialism: The Concept of Countervailing Power*, "The Case of Agriculture," pp. 159-170-195, Houghton-Mifflin Publishing Co.

[10] Calvin B. Hoover, "Implications of Economic Change," *The American Economic Review*, March, 1954, p. 12.

farmers. It is not merely fighting monopoly with monopoly power. The authority of the State is invoked to protect and conserve natural resources. The private ownership of land grants monopoly power to the individual. However, *that* power is subject to limitations in relation to neighboring farmers and to the interest of the State.

Surplus production and market dumping *waste resources.* Effective cooperation in marketing limits competition to some extent, but may at the same time increase the efficiency of production and of distribution to consumers. In general, farmer cooperatives have *not* succeeded in controlling the first step in production. The aid of the government is necessary to secure the coordination of farmers in adjusting and in conserving surplus resources for future use.

The adjustment controls in effect since enactment of the Adjustment Act of 1933 have been criticized as retarding desirable adjustments and otherwise supporting inefficiency in production. Many details of cases may be cited in support of criticisms. But in the over-all, gains offset losses. Reviewing the experience with the control programs, Gale Johnson in a paper read at the last annual meeting of the American Economics Association stated, "It can not be said that, up until the present, the farm programs have seriously impeded competitive adjustments."[11] Dr. Murray Benedict in another paper at the same meeting said that the results of the programs in the first decade of operations were to increase over-all productivity rather than reduce it.[12] Heady in an analysis of relationships in Agricultural Production Programs concludes that *"Past and current production control programs are more nearly of a nature to increase rather than to decrease the total volume of agricultural output."* These economists are "agin" monopoly and regretfully admit that results to date are more acceptable than expected. In summary, the control programs to date have contributed to readjustments with some increase in total production.

The *burley tobacco* programs have demonstrated *how controls* through the government have contributed to efficiency in production as well as to improvement in the economic position of the farmer. Before controls, the individual tobacco farmer was entirely at the mercy of a few buyers. In the first season of government intervention buyers agreed voluntarily to an advance in the price of the crop. The prospect of a reduction in planting for the next year was an important factor in that agreement. Since then the burley has been subject to some control in every season but one.

The controls have been quite effective in holding the production in line

[11] *Proceedings,* 1953, p. 114.
[12] *Ibid,* p. 100.

with requirements and in preventing prices from falling to low levels. The acreage was sharply reduced in the first year of control. Since then acreage allotments have been adjusted in line with prospective requirements. The allotments have been reinforced by marketing quotas in every season since 1938 with the exception of 1939. The harvested acreage has usually been held about in line with the allotments. In addition, the position of the producer in the market has been supported annually since 1940 by minimum price supports. The offer of the government to take over any tobacco for which the bid does not equal the support price, has proved a very effective means of support.

The results to the producers: Prices and incomes have been raised and stabilized. As to the effect upon production, the analysis by Glenn Johnson indicates that *stability has been a source of increased efficiency.* Yields per acre increased at the rate of about 60 pounds per year and growers seemed to be willing to supply larger quantities at a given price.[13]

Technological advances contributed to increased yields. Apparently the controls encouraged the adoption of technological improvements to offset the restrictions upon acreage. Another significant point commonly overlooked is that the control programs retained for the growers economic gains from the use of technological improvements.

The supply of burley tobacco to buyers for the increased demand for its use in cigarettes has been met by adjusting acreage allotments upwards and by increasing yields. In effect tobacco manufacturers have been guaranteed adequate supplies at relatively stable prices. In relation to the price level prevailing before control, the price of tobacco has continued about in line with prices of other farm products.[13]

A recently published economic analysis of the potato programs also supports the thesis that the *stabilization of prices* through government aid *contributes to efficiency in production.* Attempts at control of potato production and marketing failed. But the use of price support incentives succeeded in increasing production to meet needs under war conditions. The continuation of supports introduced an element of stability which encouraged producers to invest resources and adopt technological improvements which resulted in the maintenance of surplus production after the war until the program was abandoned. An economic analysis indicates that consumers gained by having potatoes at prices averaging lower than they would have been without the support program.[14]

The stabilization of the production and handling of fluid milk in local

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[13] Glenn L. Johnson, *Burley Tobacco Control Program,* Bulletin 580, Kentucky Agricultural Experiment Station.

[14] *An Economic Analysis of the Impact of Government Programs on the Potato Industry.* Bulletin 211, The University of Minnesota Agricultural Experiment Station.

markets through cooperatives, supplemented when desirable by marketing agreements and orders, appears generally satisfactory to both producers and consumers. Organization of the market not only strengthens the bargaining power of the producers, but also contributes to the assurance of reasonably adequate supplies at stable prices held within bounds set by outside conditions. While I have seen no analysis of the effects of milk market stabilization upon production, from observation I believe it encourages increased investments in *good herds,* and in the necessary equipment for maintaining quality as well as volume of production. Consumers probably get more and better milk on account of cooperative stabilization than they would through unregulated competition.

I have concentrated to some extent on terms of exchange and the significance of stabilization of production and prices through government aids to coordination, because it seems to me that the potential evils of monopoly have been emphasized *too much* by economists. Theoretical preconceptions have been a handicap to objective analysis and appraisal of government programs and operations. I do not intend to endorse without reservation the indefinite extension of controls through the government, but only to say that the alternative results should be considered, and the degrees of control limited to what may be necessary to achieve the desired results.

I want to commend the economists who have devoted themselves to objective analysis. The lesson for all agricultural economists is to *challenge* all assumptions and theories, reformulate them in line with observed facts, and treat them as tools not as masters.

The time limit did not permit me to deal with the mistakes and lessons learned with reference to the *problem of too many farmers.* With the permission of the Editor I wish to record an observation that confusion in objectives between relief and economic efficiency has practically sterilized thinking and positive action towards securing an adjustment of the number of those engaged in agriculture to those required to meet the *normal national needs* from farm production.

AGRICULTURAL ECONOMICS IN THE DECADE AHEAD*

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AS THE title of this paper clearly suggests, I am to discuss developments in the discipline of Agricultural Economics over the next decade. Now one might interpret this assignment to mean the more probable developments, or the developments that need to take place or some combination of the two. I will pursue the latter course. Where I have a good hunch or a trend to follow, I will don the hat of a forecaster. But more generally, I will discuss some of the things that we ought to do, or ought to try to do, over the next ten years. This is my opportunity to give my fellow economists some free advice, and I intend to use it.

Expected Developments

First Forecast: The present heavy emphasis on marketing research will subside. I doubt that the number of dollars devoted to marketing research will be reduced materially, but I would guess that other phases of agricultural economics research will gain relatively in terms of budget and conceptual importance. By marketing research, I have in mind the same areas and types of work, that the Agricultural Research Administration has specified as comprising marketing research, namely, "marketing research under the Agricultural Marketing Act is interpreted as research on the organization, methods, and practices used, and operations involved in the transfer of title and in the physical handling of products, in their natural or processed form." Work on price formation and price behavior is not excluded by this definition, but emphasis is placed on assembling, packing, packaging, handling, transporting, grading and storing farm products, on the operations of middlemen and marketing institutions and on the development of improved ways of moving farm products through the distributive system.

In this forecast, it might be said that Cochrane is following the old adage—"that which goes up must come down." Perhaps he is to some degree. But there would seem to be more substantial arguments involved. In my view, it is no accident that the Agricultural Research and Marketing Act was passed in 1946 and marketing research was given another "shot in the arm" in 1954. In both periods the prospect of and the fear of agricultural surpluses, falling farm prices and reduced farm incomes prompted an expansion in marketing research. Congressmen voted for an increase in funds for marketing research in the *hope* that such re-

* Miscellaneous Journal Series 864, Minn. Agr. Exp. Sta.

search might solve the price-income problem in agriculture. The collective hope of Congress would, however, seem to run first in terms of one theme and then in terms of another. First theme: if we investigate this great, sprawling, complex marketing system sufficiently we may find an important new market for farm products, an important source of demand that has been overlooked—a voracious maw, if you please, down which farm products may be poured endlessly without cost to the government and with price enhancing consequences. Second theme: the marketing spread between farmer and consumer is too wide—too much of the consumer's food dollar goes to middlemen—and perhaps a part of this spread can be captured for the farmer.

Now the first of these hopes is grounded in ignorance and make-believe. There isn't any wonderful new market for farm products at home or abroad to be uncovered with a little research. Hunger guarantees that the human stomach will be filled several times a day, and with high-resource-using foods insofar as income permits, but where income is lacking so is the market for farm products. This has implications that the present Administration and various commodity groups would do well to ponder. Foreign demand will be expanded only insofar as the incomes of undernourished peoples are increased—possibly by the United States. At home more consumers are suffering from too many calories and obesity than from undernourishment, and per capita increases in the consumption of one commodity must on the average come at the expense of another food commodity. The real potential for demand expansion exists in the area of *food services* not food *per se;* the modern housewife will go to almost any lengths to escape the kitchen.

The second hope is more like a mirage. The farmer and congressmen see the marketing spread, but they can't put their hands on it. Except for some monopoly profits in the farm marketing system, which I believe to be minor, the marketing spread has grown and continues to grow with the handling services that must be provided with increased specialization in production and the increased demand for services and conveniences by consumers. These services are as real as an egg or an apple or a potato, and payments for them, of course, belong to the suppliers of the services. The only way farmers may expect to capture a part of the growing marketing spread is through the provision of these services and this farmers and their leaders will discover is not a costless operation. Thus, this hope too turns out to be a forlorn one. In all this, note that I have used the word hope; I don't know what the individuals involved believe.

I am aware that the overwhelming majority of researchers in marketing are not looking for beneficent rat holes down which farm surpluses may be poured without cost to the government or ways of turning back

the clock with respect to the marketing spread. They are concentrating on the eradication of particular inefficiencies in the marketing system and the promotion of more efficient methods and practices. But widespread successes on the part of these many researchers will not, I believe, save marketing research from suffering a reaction. As we know, the fruits of more efficient methods tend to be passed along to the consumer in the form of lower prices or improved products. This is not what many of the proponents of increased marketing research in the Congress of 1946 and in the Congress and the Administration of 1954 were and are looking for. They are looking for miracles; they are looking for surplus-removing, price-raising panaceas, which I for one don't think exist.

With the failure of marketing research to solve the farm price-income problem, real or anticipated, a certain amount of disillusionment will develop in the minds of farmers, farm leaders and politicians. The hope that has been centered in marketing research will be transferred to something else, and those engaged in marketing research will suffer some loss of status, and possibly some funds. If I am correct, marketing research will suffer because leadership in agriculture, inside of Congress and out, still does not appreciate what marketing research can and cannot do.

Second Forecast: Departments of Agricultural Economics in colleges and universities will generally become stronger and do more effective research and teaching over the next decade. This view is based on something more than a "pollyanna" outlook; it is based on two developments, one past and present and the other prospective, which will, I believe, complement one another. The first is the improved, indeed the excellent, training that graduate students in Agricultural Economics have received during the past decade. This training will certainly pay off in the forthcoming decade.

Typical of any science or discipline that is developing rapidly, we have had some outstanding leadership—leadership in the choice of problems to be studied, in the analysis of those problems and in the guidance and training of the last generation. But it is a fact, I believe, that there once was a time when the rank and file of agricultural economists knew precious little economics and used still less. This is no longer true. Economists plying their trade in agriculture, who were trained in the last decade or so, are on the average as well grounded in economic theory and analysis as professionals in such other applied fields as money and banking and foreign trade. In short, we are reaching the stage where the typical young agricultural economist *uses* economic theory to guide and direct his research efforts. The typical young agricultural economist no longer just goes out and counts trees or packing boxes, he is con-

cerned with conceptualizing and measuring key economic relationships in agriculture. This represents real progress and sets the stage for more effective research and teaching in the decade to come.

The capacity is there, but the incentive will come from another direction. In my view the incentive to do outstanding research and teaching will come from a continuation of the type of surplus, price and income problems that we are now experiencing. Dragging farm prices and lagging farm incomes will provide agricultural economists with an incentive to do outstanding work in the decade ahead; and this incentive will exist for the production man, marketing man, credit man and land economist as well as those interested in farm prices. The problems of a depressed agriculture have a way of seeping into all phases of agricultural economics research.

In all this I am assuming a growing, enveloping atmosphere of peace. I do not know whether this is meaningful assumption or not. But I no longer believe that this nation will accept limited hot wars, and I cannot imagine what the world may be like given a third world war. Thus, I must assume what I fervently hope for, namely, peace. But given peace, I foresee difficult, and general problems for agriculture in the decade ahead. Basically these problems will grow out of a persistent tendency for the aggregate output of agriculture to press against aggregate demand. This problematic situation will induce agricultural economists to do the best work that we have yet seen.

Third Forecast: As a corollary of the previous forecast, I would suggest that empirical investigations—measurement—will become more effective but not necessarily more complex in the decade ahead. In other words, I think we will have more and better measurement in the next decade than in the last. By more and better, I mean estimates of economic relationships not heretofore obtained and more reliable estimates of relationships for which we now have measures.

Probably the most important factor in recent and prospective measurement work is the widespread understanding and use of economic theory. This theory provides hypotheses with respect to how the economic system works, hence suggests the relationships that need to be measured or estimated. And when the researcher goes out to measure something there is no substitute for knowing what it is he seeks to measure. But all of this was implied under the second forecast. What else is in the picture to suggest a continued improvement in measurement techniques? There would seem to be three developments that suggest more and better work along this line.

First, we have learned a lot in the last few years with respect to the use of single equation regression techniques in estimating the various

parameters of the economic system. Fox and Foote have done some good work in the way of showing us when and where single equation techniques may be used to measure demand relations. And more recently Wold and Jureen have pointed out the general situation, which has important implications for agriculture, where single equation regression methods may be used appropriately. Thus, the single equation technique, which was taking a terrible beating two or three years back, would appear once again to have found a respectable place, and a more effective place, in our kit of statistical tools.

Second, the simultaneous equation approach, developed to yield reliable estimates of economic relationships where the variables involved are jointly dependent, is slowly moving to the point where the practicing economist can understand and use the technique. I know because I can almost understand the method now. For those who wish to gain some understanding of the method, and are willing to work for it, let me recommend Cowles Commission Monograph No. 14 entitled *Studies in Econometric Method,* especially Chapter VI carrying the title, "The Estimation of Simultaneous Linear Economic Relations." This volume goes a considerable distance toward making this approach understandable for the working economist. I would predict that the agricultural economist with a little flair for statistics will be using this method whenever it meets the needs of his problem by the end of this decade that we are talking about.

Third, the economist interested in measurement has had his position strengthened further by the development of Linear Programming. This method, which turns away from the older type of marginal analysis and works with production processes—the substitution of one process for another—admits of a quantitative solution to the classic economic problem, namely, what combination of resources maximizes the net return of the firm involved. The researcher using this technique can obtain a quantitative description of the combination of production processes involving specific combinations, or bundles, of resources that maximizes the net return of the farm firm, real or synthetic, under consideration. Or the method may be used to derive a minimum cost combination as Fred Waugh has done with respect to dairy feed.

It is worth noting that the mathematical and computational procedures involved in Linear Programming are not overly complex; the researcher who remembers his algebra can follow them. Conceptually too the use of production processes in the analysis would seem to be consistent with the behavior of farm firms; farmers seem more inclined to change or shift processes than to vary inputs incrementally. Thus, the analyst has a powerful new econometric tool for use in the years ahead.

Because then of these developments in statistics and econometrics:
(1) a better appreciation of the proper use of single equation regression techniques
(2) a progressive popularization of simultaneous equation techniques, and
(3) the development of linear programming
we can expect more and better measurement in the decade ahead.

Needed Developments

This completes my discussion of probable developments in Agricultural Economics in the next ten years, and I now want to turn to a consideration of needed developments. It might be that each of the needs, which I plan to discuss here, would find fulfillment in the general strengthening of the discipline of Agricultural Economics as predicted above. But to place my views in the record, let us consider four needed developments in the discipline of Agricultural Economics.

First: We need to develop some reliable supply relations for use in predicting output responses, in the short and longer runs, by commodities and in the aggregate. When the Secretary of Agriculture lowered the level of price support on milk for manufacturing purposes this spring I heard responsible economists predict that the output of milk would increase, would decrease and would remain unchanged. Now clearly this is not good enough. Moreover I would say that the views held by agricultural economists, with respect to the probable output response to a given price change for most farm commodities, vary almost as widely as that indicated above for milk. Then again for some peculiar reason some agricultural economists don't consider output responses that occur via the technological advance route as being quite fair; hence ignore them in their generalizations. In short, we have few predictive supply relations in agriculture worthy of the name.

But equally important we have a desperate need for them. So long as we have some sort of price support, some one for some reason is going to want to lower or raise the level of support on some commodity. Where this is the case agricultural economists should be able to speak with some authority as to what the supply response will be—first in short run and then in the longer run. We don't speak with authority now, and for one important reason. Decision makers in political markets and in more conventional markets find economists at every point of the compass with respect to probable output responses to a price change.

I would say that the time has come for production economists to lay aside some of their work concerning individual farms and price econo-

mists to lay aside some of their work on demand analysis and pool their resources in an effort to develop some usable supply relations. The derivation of predictive supply relations is not, I believe, a more difficult problem than the derivation of demand relations, and return maximizing studies for individual farms are not, I believe, more important than supply response studies. Thus, I can't understand why we continue to live with this gaping hole in our over-all pattern of knowledge. But the fact is that it is there, and it is time that we set about filling it in with some usable knowledge.

Second: We need to develop more effective methods of controlling and adjusting agricultural production by commodities and in the aggregate. I base this statement of need on two propositions: (1) at least prior to the presentation of Secretary Benson's cross-compliance plan we did not have an effective method of production control, and it remains to be seen how this proposal works in practice and (2) the majority of farmers are unwilling to accept the relatively wide price fluctuations that are generated in free markets for agricultural products. Here I refer first to the longer run gyrations of the farm price level, and second to the shorter run price variability of certain commodities around the moving farm price level.

The first proposition does not need to be amplified. You either agree with me or you don't. The second proposition does merit some further consideration. It is my thesis that farm prices are inherently unstable. This instability grows out of the severely inelastic demand and supply relations to be found in the aggregate for agriculture, as well as in certain individual commodity lines. Further, it is my thesis that the majority of farmers don't like this price instability. They have been saying so since the Civil War, and they are ready to accept controls to avoid this instability (witness the ready acceptance of wheat and cotton marketing quotas and the tenacity with which fluid milk producers and tobacco growers hang on to their control measures). The majority of agricultural economists notwithstanding, the majority of farmers do not want free markets for agricultural products; they want "stabilized free markets."

Now effective demand expansion programs are difficult to launch, and they are not readily reversible. Lest there be any doubt, I continue to believe in demand expansion at home and abroad, but I know that effective demand expansion programs cost money and I don't think they should be used as purely counter-surplus devices. We cannot expect to turn demand expansion programs on and off among the aged at home or the undernourished abroad as the needs of farm price stability dictate. And effective labor mobility programs tend to be politically unacceptable, and are not readily reversible. I have never seen a farm congressman that was

interested in this type of adjustment, except possibly to cut the budget of the agency making the proposal.

Thus I would argue that we need to do some social engineering with respect to controlling and adjusting production. We need to help those producing groups, that want help, to develop ways and means of adjusting supplies to demand. Wheat growers, potato growers, cotton growers, producers of milk for manufacturing purposes and other producing groups want, and I am prepared to say need, to develop controls over production comparable in effectiveness to those exercised by steel, automobiles, tobacco and for the record, the fluid milk industry. The realization of the goal of price stability at reasonable levels requires a conscious and continued adjustment of supplies to demand. Certainly this fixing of prices first, and then scurrying around later to do something about the market surpluses, or deficits, that result will not work. We know this. And I have the further feeling that if we, as economists, work with producers on this problem we may get control measures that are more, rather than less, socially desirable.

Third: We have to learn how to do more effective research in marketing. I know that some people will not agree with this view, and I can imagine that they are thinking or mumbling—"Why does Cochrane insist on making a whipping boy of marketing," or possibly "there is nothing wrong with marketing research that is not also wrong with other types of research in Agricultural Economics." But I happen to believe that there is something wrong with marketing research and that in general it is not as effective as it could be.

Much marketing research originates, I believe, with a false premise and a social aversion. The false premise is that there must be some inefficient practices lurking about in the marketing system to be discovered and removed. The social aversion is that we cannot help the middleman maximize his return—a solution to the classic resource problem is taboo for marketing firms. It would seem that both the premise and the aversion stem from the age old concern with the marketing spread. In farm management research we typically do not start out with these handicaps. We know we want to help the farmer increase his return, and we think the best way to provide this help is through an analysis of his whole farm operation. We consider the resources available, the methods employed, the probable input-output relations, and on the basis of these considerations suggest a plan of operation designed to maximize the net return of the farm firm involved. I think we would be a lot farther along in marketing research if we followed this same general approach.

In fairness to all concerned it should be noted that many researchers in marketing have adopted this firm approach. The group at California and

others scattered across the country have been concentrating on the operations of marketing firms, seeking in their researches the optimum combination of resources for the firms involved. The intensive California studies of particular packing plants suggest, however, one of the limitations of even this approach in marketing. If the findings for a particular firm, real or synthetic, have only limited application due to the heterogeneity of the firms in the industry, one is forced to stop and ponder the question—How much in the way of research resources can we afford to tie up in the study of a particular firm? John Brewster in his recent study of cottonseed oil mills seems to have hit a happy balance in this respect:[1] his analyses are conducted in terms of the optimum combination of resource inputs for different size and technological types of mills. Certainly we cannot afford to make an intensive analysis of every marketing firm; our firm analyses must lend themselves to generalizations with respect to the operations of a class or strata of marketing firms. But neither can we afford to hunt aimlessly for inefficiencies in the marketing system. Firm theory suggests a reasonable approach to efficiency problems in marketing. Our problem is to adapt that approach to the unique aspects of marketing firms handling farm products.

Fourth: We need to develop an explicit and usable general theory of economic behavior in agriculture. And by general theory I have in mind a conceptual, or organizing, framework which relates and integrates bits and pieces of understanding concerning economic behavior in agriculture into a meaningful whole. Now some folks may say—"What in the world do we need one of these things for?"

My answer to that kind of a query runs as follows: We all have and make use of a general theory of economic behavior in agriculture whether we recognize it or not. Such a general theory enables us to sift the relevant facts from the irrelevant, to select key relationships to be studied, to infer causality to relationships, to interpret research findings, and to narrow areas of judgment, or controversy, with respect to the behavior of economic variables, hence facilitate decision making. For example, the theory of a severely inelastic aggregate demand for food, accepted by most price economists, makes the consequences of a general farm surplus, however small, abundantly clear and facilitates decision making with respect to it. The question is not whether we need such a general theory; we must have one, for we all make use of the organizing framework that theory provides, in either an explicit or implicit form, in our every day thinking and work. The important question is—Do we have a generally understood, consistent theory which adequately explains economic behavior in agri-

[1] *Cottonseed Oil Mills: Their Comparative Efficiencies and Effects on Prices and Producers' Returns*, U.S.D.A. Agric. Info. Bul. No. 103, June, 1953.

culture? By this I mean—Do we have a theory which leads to the same answer when employed by different analysts, a theory that integrates the behavior of all sectors of the agricultural economy and a theory which describes—explains—how the agricultural economy works?

Now here again some folks may say—"yes we do." We have an equilibrium theory, which in English, at least, found its first complete expression in the work of Marshall and which has been modified and refined by numerous writers since his day. I agree that we do have this traditional theory, and I recognized that it provides most of us with the general theory that we employ from day to day. But I am not sure that this traditional theory which comes down to us from Marshall through such modern writers as Stigler, Bain and Scitovsky provides a useful, effective theory in food and agriculture. This theory was formulated by men reared in urban communities whose experience and interests were and are dominated by urban life, hence their formulations are concerned with explaining the economic behavior of manufacturing plants, wholesale establishments, and retail outlets. It has been simply assumed by them and by many of us that this theory fits the facts of life in agriculture. But does it?

Traditional theory pays little or no attention to firms that provide a way of life and a home as well as an occupation; it invariably assumes overhead costs to be relatively small; it ignores the peculiar mobility and substitutional problems associated with land and farm labor; and it finds much with respect to food consumption that is unusual or exceptional (e.g., Giffen's Paradox; the restricted substitutional relationships between food and nonfood; nutrition education versus the doctrine of free choice). In short it fails to take into account certain important conditions and situations commonly associated with food and agriculture. Hence, we shouldn't expect to appropriate and use without modification and adaptation a theory developed by urban economists to explain the behavior of firms operating in the urban economy. But we have done this, and in doing so have been led astray. The familiar Marshallian cross has served as our conceptual framework whether it fits the conditions of agriculture or not.

Some workers have tried to adapt and modify traditional equilibrium theory to fit the needs of agriculture, hence provide an explicit and effective general theory for economists working in agriculture. T. W. Schultz in his volume *Agriculture in an Unstable Economy* made an important contribution in this direction. The rudiments of a general theory of economic behavior in agriculture are to be found in this work. But despite much better data and measurement work, he does not improve on the conceptual framework laid down in *Agriculture in an Unstable Economy* in his last volume *The Economic Organization of Agriculture*. On the con-

trary he beclouds his emerging conceptual framework with irrelevancies in the latter volume.

Thus as matters stand in the summer of 1954 there exists the need, and plenty of room, for ambitious agricultural economists to present the profession with a general theory of economic behavior in agriculture. I would not expect that a usable and acceptable formulation would come in the form of a divine revelation. I would expect that it would represent an adaptation of traditional equilibrium theory and that it would build upon what Schultz and others in the field have already done. But certainly it must come, and I believe that it will come within the next ten years.

Summary

This brings to a close my crystal gazing and admonitions on specific topics. Looking back over this paper I can think of many things that might have been said (for example, with respect to the administration of research, instructional problems, and specific commodity problems), and some things that might with more prudence have been left unsaid. But I observe that one idea, or pattern of ideas, threads through much of this paper. In some places this thread takes the form of what will happen and in others what should happen. And I expect that those who know me best were not surprised by it or perhaps even noticed it. I refer to the reoccurrence of the role of theory: the adaptation of traditional theory for use in agriculture and the use of that theory in guiding and directing research.

I may be open to the charge that I have overworked the role of theory in this paper, as well as in my work. But I have a profound respect for theory. A science makes advances (i.e., develops understanding that enables humans to control natural and social phenomena) only as the workers in it formulate, use and reformulate theory; this has been true of physics and it is true of economics. Facts and data are meaningless in and of themselves. They have meaning only insofar as they are strung together in relationships. And theory suggests in any investigation that explores the unknown ways in which facts and data may be related. In this process some theories may be tested and become laws, others not amenable to testing may be used over and over again because they seem to explain behavior (e.g., equilibrium theory), and still others must be discarded or reformulated because they don't provide a useful or adequate explanation of behavior. This is the way understanding grows in a field—first observation and the gaining of experience, next the formulation of an hypothesis or theory of behavior, then a testing of that theory against reality as represented by empirical investigations, and to the extent that the theory fails to explain behavior we reformulate it, modify it, and test it again and again

against measures of reality. Essentially too, this is what I mean by the terms adaptation and use except that in *adaptation* the emphasis is upon developing a theory which explains more adequately than the older or parent theory and in *use* the emphasis is upon the derivation of estimates of relationships to be used in turn in decision making.

In conclusion, I would assert that the progress realized in the discipline of Agricultural Economics during the last decade has rested on the willingness and capacity of researchers to grasp the received theory in economics, to adapt that theory to the unique conditions of agriculture and to use that modified theory to guide and direct empirical investigations. Progress in the decade ahead will depend upon more, and more effective, work along these same lines.

IMPROVING AGRICULTURAL ECONOMICS RESEARCH

Chairman: A. J. Brown, University of Kentucky

MAJOR OPPORTUNITIES FOR IMPROVING AGRICULTURAL ECONOMICS RESEARCH IN THE DECADE AHEAD

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IF IT had not been for President Cowden's desire to have someone take a serious look at agricultural economics research, I would have been tempted originally to prepare some gracious tactful statements about our glorious research opportunities and let the assignment go at that. One reason for feeling this way was the embarrassment one feels in talking as if he has all the answers about opportunities which so many are trying so conscientiously to exploit. Another reason for desiring an easy way out was the divergent beliefs which appeared to exist among members of our profession concerning the state of agricultural economics, methodology and opinions as to what is or is not worth working on.

In order to avoid difficulties due to these divergencies, the comments to follow will be based partially on certain recent pronouncements as to the state of agricultural economics. These were made at last fall's meeting of this association by O. V. Wells as the main speaker with Max Meyers, Raleigh Barlowe and Robert Clodius as discussants,[1] by a Social Science Research Council Committee on Agricultural Economics[2] on which I serve, and by John D. Black, T. W. Schultz and O. V. Wells at the joint meeting held last Christmas between this association and the American Economic Association.[3]

A candid appraisal of the people making these pronouncements, indicates that they run rather heavily to the Chicago-Harvard-Iowa and Wisconsin points of view with little stress on traditional farm management, Cornell and Purdue viewpoints. A careful consideration of the beliefs and values involved in the pronouncements relative to these other points of view revealed more common ground than had, at first, appeared to exist. This common ground made it possible to list a set of intermingled beliefs and values which appear to be held by a substantial portion of the profession as a substantive foundation on which to build this paper. The list of

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[1] O. V. Wells, "A Survey of Contemporary Agricultural Economics," *This Journal*, Vol. XXXV, December, 1953, pp. 668f.

[2] Social Science Research Council, "Committee Briefs in Agricultural Economics," *Items*, Vol. 7, No. 4, December, 1953.

[3] Lawrence Boger, "Important Professional Problems Facing the Agricultural Economist." *This Journal*, Vol. XXXVI, May, 1954, pp. 304f.

beliefs and values with which I think most of you will agree follows:

1. Agricultural economic researchers are producing a significant product. Further, this research product is held in high regard.
2. Agricultural economics research exists to serve farmers and if it fails to do so it will cease to exist. It is also widely held that research exists to serve non-farm groups handling and consuming farm products. A very substantial number of our profession hold that it also exists to serve society in general. These beliefs and convictions fairly well define the problems on which agricultural economists are expected to work.
3. Despite a substantial product, much inefficiency exists in the research effort. The belief is widespread that this inefficiency involves both individual workers and administrative organizations. This inefficiency is generally deplored and many members of the profession feel that "something should be done about it."
4. A substantial part of the inefficiency is due to imbalance, on the part of both individual researchers and research organizations, with respect to their use of statistics, knowledge and understanding of agriculture, economic theory, mathematics, related social sciences, the humanities and the physical sciences. Though there is unanimity with respect to the existence of this imbalance, there is little agreement as to its directions.
5. Fundamental research is a prerequisite for service research defining the latter as research usable in solving economic problems of individuals or organizations while defining fundamental research as research on the problems of service researchers.
6. Much published research fails to solve the communication problem.
7. A significant lag exists between completion of service research and its adoption.
8. Service research, teaching and extension work are crowding out fundamental research work to the long-run detriment of the profession.
9. The traditional efficiency norm of economics is a necessary but insufficient basis for judgment in doing research on the problems addressed to agricultural economists.

The above statements are unsatisfactory as a basis for this paper in two major respects. One of these is the lack of unanimity as to the direction of the imbalance in the use of different research tools, concepts and disciplines. The other is the inconsistency between belief in serious communication and lag problems, on one hand, and the belief that fundamental research is being crowded out by service research, extension and teaching on the other.

Those disagreeing on tools, concepts and disciplines, it appears, cannot be easily reconciled. As an alternative to reconcilation, your speaker's position on this matter will be stated and followed in the remainder of this paper. This will have the advantage of placing the methodological beliefs and values on which this paper is based out in the open for your criticism and acceptance or rejection.

This paper, then, is based on the conviction that solution of both fundamental and service research problems requires prior answers to questions of fact and to questions of theory or abstract relationships. It is also based on the conviction that answers to either fundamental or service research questions may involve facts, abstract relationships or combinations of the two. This experimentalist approach[4] uses both theory and empirical information as integral, component parts of the conception and solution of research problems, the relative importance of the two being dictated by the problem faced. If empirical counterparts of abstract relationships are to be estimated, statistical procedures are required and if these estimates are to be manipulated, mathematics and logic are also required. In addition, the paper is based on the belief that problems are defined by differences between convictions as to what "ought to be" and concepts of "what is." This position involves the humanities, physical sciences and social sciences in solving the economic problems of agriculture. The relative need for these other disciplines however is determined by the problems faced.

The inconsistency between believing jointly in the existence of communication and lag problems, on one hand, and that fundamental research is being strangled by service research, extension and teaching, on the other, will be permitted to work itself out as problems and opportunities are discussed. With these two modifications, the stated list of beliefs and values will be used as the foundation of this paper.

The Opportunities in the Decade Ahead

The discussion to this point suggests that opportunities for improving Agricultural Economics Research might be considered under three headings: service, fundamental, and administrative opportunities. Under the fundamental heading, concepts, methods and data will be discussed separately.

Service research opportunities

Major service research opportunities are plentiful between farm management and land economics, on one hand and the physical sciences on the

[4] G. W. Churchman, *The Theory of Experimental Inference*, New York: The Macmillan Company, 1948.

other. The hybrid vigor resulting from working jointly on production problems with representatives from the physical sciences in applying static production economic concepts is the force with which to exploit this opportunity.[5] The fear, expressed by Schultz at the Christmas meeting, that such efforts lead to research stagnation[6] is not shared by your speaker.

Similiar opportunities exist with respect to static production economics and service research in marketing. Here the opportunity lies in cooperating with retailers, processors, nutritionists, plant layout men and engineers whose interests are less staked out as the domain of other academic departments than are the corresponding technical areas for farm management workers. This leaves marketing men freer to exploit this opportunity. Why have they been so slow to do so? Perhaps the failure is due to a narrow conception of the field of marketing. It makes a great deal of difference whether marketing deals only with those farm management problems having to do with purchases and sales rather than including study of the production, utilization and demand for marketing services produced by non-farm firms. The later broader concept of marketing seems to present significant opportunities for the decade ahead.

The opportunity for servicing both farm and non-farm firms exists with respect to consumption economics as well as production economics, the two being almost inseparable at the dynamic level. As the groundwork for a dynamic economics is established, superstructure follows. Already service research in farm management is being based on this development. The proceedings report of the Bozeman Work Conference on Risk and Uncertainty rather adequately explores this area. There is a corresponding nearly virgin field in marketing. Clodius, at Wisconsin, is getting some marketing work underway here. It is also important to note that existing fundamental work in dynamic economics would now support some superstructure in the dynamics of household management. Such superstructure would help service researchers and others in consumer counselling and cooperative management outgrow the empericism and indoctrination characteristic of much past effort in these fields.

Your speakers experience covers observation of Otis Osgood's work in

[5] Actually the lack of such work appears to be a major bottleneck in experiment station research. I would go so far as to say that a masters candidate capable of standing an examination in modern production economics, should be able to increase the effectiveness of research in agronomy and animal husbandry very substantially in any State Experiment Station in the U.S. if the way were cleared administratively for him to do so.

[6] T. W. Schultz, "Theory of the Firm and Farm Management Research," *This Journal*, 1939, pp. 570f. Also see Boger, *op. cit.* Black expressed an opposing point of view to Schultz's both at the Christmas meetings reported by Boger and at the discussion of the Bowen report at the meetings of American Economic Association at the same time.

Northeastern Mississippi and of C. O. Bondurant's, Charles Wyatt's and Cap Edmond's work in Western Kentucky. This list includes a local citizen, a researcher and two extension workers, who have one characteristic in common—they are working on the problems of local areas. The approach consists of having workers from one or more disciplines located at the site of a problem with the most intimate knowledge possible of the agriculture and farm people involved. The results in the cases mentioned indicate an important opportunity for improving service research.

Another problem more than worth working on has to do with the use of inducements in adult education. The role of free, test-demonstration fertilizers, credit-linked managerial services, SCS payments and other incentives in seeking economic progress needs evaluation.

The need for cooperating with other social sciences and the humanities is more important in service research than it appears on first consideration. Managerial economics involves psychology and sociology directly. Individual wants, preferences and desires of people indicate much about the demand for farm products. Understanding of norms and value systems helps when social choices of consequence are being made. Legislation, the voting processes, press activities, and especially, the activities of farm organizations would be improved by clarifying the meaning of and interrelationships among such concepts as freedom, equality, security, efficiency, free competition and free enterprise.

Analytical description also offers an opportunity in service research on policy questions. For instance, the impacts of government control programs require careful continuous appraisal, act by act, ruling by ruling and county by county, if we are to be able to advise farmers, legislators and organizations on control policies. Tremendous changes result from the interaction of legislative, administrative, economic and climatic processes. Political science is involved in studying these programs. So are the humanities as non-tangible assets are created, destroyed and redistributed in setting up and operating programs, in the name of justice, equality in the family farm, etc. Economic principles dealing with efficiency and general welfare on the assumption that asset ownership patterns are unchanged or can be compensated need drastic supplementation if these very real problems are to be described and analyzed competently at the service level.

Also in the field of policy, strong conflicting assertions are made about price responses. Persons basing their convictions on theory argue for responsiveness while those basing their opinions on data argue that production is sometimes increased as a result of price declines. An econometrician suspects that those arguing from fact face an identification problem as they observe intersection points of simultaneously shifting supply

and demand curves rather than different points on a stationary supply curve.

Interregional and international service research offer many opportunities. Alternative surplus disposal plans need careful evaluation in terms of the relevant norms, values and the exigencies of the international situation. Inconsistencies *within* trade policies need study as well as those between foreign and domestic policies which were explored by D. Gale Johnson. Both interregional and international comparative advantage problems need attention with careful emphasis on changes in demand, technological change and changes in the geographic distribution of both accumulated and non-replaceable resources.

Systematic professional criticism also offers an important opportunity for improving service research. Once published by a land-grant department, the service product seems to be protected from formal attack by a sort of "rogues" agreement running as follows: If I leave yours alone, you'll leave mine alone and, besides this, it would be indiscrete to wash the systems dirty linen in public. Hard, careful thinking on the part of researchers is not encouraged by this procedure. Further, irresponsible, unpublished private criticism goes on without being forced to demonstrate its validity publicly.

As service research is problem orientated, methodological opportunities arise primarily when new methods make new solutions possible. Several new methodologies or techniques have been developed recently. The simultaneous equations approach, developed by fundamental researchers, has yielded useful results in several studies. Instead of lamenting that "it seems an oddity" that "Professor Twist," a fundamental researcher, "never studies commodity" it appears that service researchers bear the responsibility for studying the commodities. The same is true of linear programing though your speaker feels that the prospects look less promising for this technique in agricultural economics. The curvilinear relationships of agricultural production introduce an almost prohibitive member of activities into some problems. Further, the technique concentrates on fixed not variable inputs. Though theory of games computations have yet to be used to solve a real problem in agricultural economics, they appear, as a minimum, to have real possibilities in working out optimal strategies in risk situations. The bottleneck appears to be a lack of training on the part of both mature and new recruits in the ranks of service researchers. No matter how simply and intuitively a new technique is presented, the service researcher has to have a minimum training in theory, statistics and mathematics to grasp and manipulate it well enough to apply it. One can only pity the Ph.D. candidate who thinks there is a way of talking or "communicating" himself out of the tough job of mastering research tech-

nique and methodology. Though older workers have asked for refresher courses and the Social Science Research Council is working on a handbook to meet deficiencies in the training of workers, there is much resistance at many institutions to raising standards for graduate students in these respects. It appears to your speaker that difficulties due to lack of competence on the part of service researchers is often mistaken for a communication problem. Though this is a research paper, the comment also applies in extension. Thus the real opportunity here appears to be one of developing professional competence to speed adoption of technique and results. Special schools, workshops and technical explanatory manuscripts are needed. Above all, real sincere administrative recognition of the importance of such improvements is required to motivate service researchers.

Method and technique cannot be discussed at the service level without mentioning electronic computors, tabulators and sorters. One reason for being somewhat pessimistic about mass tabulation and sorting is that it has always been possible to amass, tabulate and sort data faster than the sorts and tables could be used in testing hypotheses and in analytical work. The electronic computors are different. They aid analysis. Hence, the opportunity appears to be with them. But here again, a bottleneck exists. Ph.D.'s in electronic computing are needed to transform problems into forms the machines can handle, to set up the computations and to transform results back into usable form. As few such people exist encouragement of training is an opportunity to be exploited.

Fundamental Research

Fundamental research, as defined here, deals with concepts, research methods and data of use in doing service research.

Now what are major *opportunities in fundamental research on concepts*? In the past, most conceptualization for agricultural economics has been done in related disciplines. Fundamental researchers in agricultural economics have then adapted these concepts for use in service research. Opportunities for adapation still exist—the theoretical as contrasted to the computational aspects of linear programing and games, various aspects of dynamic economics and of imperfect competition theory cry out for adaptation by agriculturalists capable of knowing and manipulating abstract concepts.

But the future is different. Black expects "that we shall eventually do more than any single group to put economics on a plane of high usefulness."[7] We can and should do more than adapt concepts developed by others to our needs. If we do not, we will be letting more or less accidental developments in other disciplines determine our supply of fundamental

[7] Boger, *op. cit.*, p. 304.

concepts to do service research. We can not as O. C. Stine said let theory or concepts be our master—we have to be in control. Our service research experience is a good guide in selecting areas for fundamental work. But as such areas do not always interest workers in other disciplines, we have to do some of the conceptualization. The resources, properly used and administered, are available to support such needed original conceptualization.

Starting at the static level, a group of service questions are cropping up repeatedly which require fundamental conceptual work on the definition of fixed assets, planning spans and quasi-rents.[8] The definition of efficiency in static economics is also subject to fundamental questions needing attention.

There are also important concepts needed in micro dynamics, macro dynamics, welfare economics and, perhaps, in the theory of economic development. Managerial theory is embryonic as yet—it needs development as well as adaptation.[9] Conceptual work on the economics of soil conservation is still incomplete. Also, a theoretical gap is particularly apparent in the never-never land between the more completely, but inadequately, developed area of micro dynamics and macro dynamics. Development here, accompanied by empirical work, would give service research on policy and outlook a firmer foundation.

Answers to the tough problems in land economics, the economics of development, production and marketing controls have a tendency to turn on value judgments involving something other than the economists pet efficiency norm. Inadequate as they are, however, the economist's concepts built around the efficiency norm appear more complete and systematic than those existing for security, progress, freedom, equality, justice and mercy. The host of important policy problems involving such norms and values includes parity, taxes, conservation, tariffs, relief and tenure. Who is working systematically and fundamentally on the norms and value systems which are the choice criteria for evaluating the operation of the economy? The answer to that question is short enough to reveal a major unexploited opportunity for fundamental research in the decade ahead.

Also, who is working systematically on the processes by which choices on economic policy questions are reached? Arrow's study of social choices and individual preferences[10] and Hildreth's work on the same subject are

[8] Fixed asset evaluation has long been a major problem in farm and rural business record analysis. Currently, pasture evaluation problems are bringing the question to a focus.

[9] Schultz has stated, that there is no available "accepted theory for analyzing the activities and organization of the economy with uncertainty present." T. W. Schultz, *The Economic Development of Agriculture*, New York: McGraw-Hill, 1953, p. 251.

[10] K. J. Arrow, *Social Choice and Individual Values*. Cowles Commission Monograph no. 12, Wiley, New York, New York, 1951.

fundamental but need integration with conceptual work on the norms and value systems just mentioned. Frankly, it looks as if workers in the humanities do not have the necessary resources and agricultural background or, for that matter, the motivation to attack the problem.

The next question is what are the major opportunities in *fundamental* research on methodology? Though, the simultaneous equations technique, the computational aspects of linear programing, game theory and electronic computors are partially ready for use in service research, much fundamental work is still needed on them. For instance, curvilinear relationships are difficult to handle in simultaneous equations. Similarly, curvilinear relationships can make linear programing more cumbersome than the use of continuous curvilinear functions. Game theory computations handle the managerial processes inadequately especially from the standpoint of the changing marginal utilities attached to gains and losses.

Psychological and sociological techniques for gathering subjective data need development and adaptation for the use of service researchers.

The Cobb-Douglas, Spillman and other equations need fundamental work done on them by people both trained in mathematics and cognizant of potential uses in service research. Ways of transforming data to eliminate shortcomings of these functions can be developed. Better tests of significance are needed. Characteristics of these and other functions need to be systematically established. Though fundamental and important, these are mundane tasks for a modern mathematician or statistician. As his colleagues do not honor him for such work, the agricultural economist will probably have to do it himself.

There are similar mundane problems in statistics, particularly in the field of sampling and experimental design. Work on optimum sample and experimental designs for line and surface, as contrasted to point and variance, estimation is extremely fragmentary and unsatisfactory. Such fundamental work is urgently needed in doing cooperative input-output work with agronomists and animal husbandrymen and in designing value productivity surveys.[11]

Time requires that this incomplete summary of methodological opportunities give way to cursory discussion of opportunities with respect to *fundamental data*. Research opportunities would be materially improved if more adequate data were available on national and state farm expenditures; national and regional inputs (by products); wants and preferences of farm people; consumption patterns; enterprise production functions; governmental operations; and variances in yields, income and prices.

[11] A conference on value productivity estimates, to be held in Chicago this fall by the North Central Farm Management Research Committee will consider some aspects of this problem as well as certain fundamental questions concerning functions.

Research Administration

Schultz charged the profession last Christmas with stagnation. The reasons given for this stagnation were largely administrative—routine work assignments, the belief that numbers substitute for quality, lack of leadership and trivial research problems. At the federal level, a part of the problem was attributed to vested interest (growing out of job insecurity) in an index number or routine area of work. At the state level, farm record keeping might be added, as well as some of the mechanical work with cooperatives.[12] Though job insecurity may partially explain vested interests, one point should be noted: much routine repetitive research work is service research for which the system gets a major part of its public support. Thus routine work cannot be eliminated and the administrative opportunity becomes one of getting such work done efficiently and in the proper perspective.

In a somewhat broader sense, this is but one aspect of a rather widespread concern that service is strangling fundamental research. A recent article by Engel[13] emphasizes the growing tendency for research to be organized along project lines with teams of researchers studying the detailed useful ramifications of previously developed fundamental ideas. Such work, Engel points out, is important and useful but of a short run nature. In the long run, he points out, it bleeds support from public and foundation coffers at the expense of support to the sources of the fundamental ideas. Still further, we can note that projects tend to segment departments into private domains whose existence stifle the initiative of younger workers.

A closely allied tendency to strangle fundamental research arises from concern with the communication problem. The 10 or 15 year lag between research and adoption of results in the case of such developments as hybrid corn, insecticides and herbicides is used repeatedly to justify expansion of extension and teaching with loss of resources for research, the most important loss being administrative, research leadership. A pertinent question here is "What Agricultural Economics research comparable with hybrid corn has not been used?" The honest answers to this question is "little." We have had large impacts on policy, in farm management and in market-

[12] The other routine repetitive assignments are numerous, the most offensive of these probably being committee assignments to (1) "handle unsolvable administrative problems for administrators, (2) bury administratively unacceptable ideas and (3) handle routine administrative matters so as to give a democratic appearance." Such assignments often consume up to 50 percent of a research workers time. As such committees cannot meet while a person is teaching or holding an extension meeting, the time for such work comes out of the research time of people holding joint appointments.

[13] Leonard Engel, "Get a Good Scientist and Let Him Alone," *Harpers Magazine*, Vol. 208, January, 1954, No. 1244, pp. 55f.

ing. Where failure to get results across have occurred, they appear due to lack of professional competence as economists on the part of both the researcher and his extension counterpart more than to poor communication technique. Real active administrative support of fundamental research the training of economists and the basic aspects of service research seems to be required instead of "souped up" ways of presented meager poorly understood results. When real results are produced, they get used. The unbiased extension man, adequately trained as an economist, has a greater problem of locating results than of communicating them to farm people.

Schultz also mentioned trivial research assignments and lack of leadership as contributing to stagnation. These are not problems of fundamental versus service research as, obviously, trivial routine assignments and lack of leadership can exist in both areas. Researchers have trivial assignments largely because (1) they are incapable of seeing non-trivial things to work on, (2) their environment prevents work on non-trivial things, (3) their environment encourages trivial work, or (4) they lack motivation. For those workers who are incapable of seeing, administrators can provide leadership either, personally, with administrative authority and their own research know-how or through delegation of leadership to personnel who can see. If the environment prevents work on non-trivial matters or encourages trivial work, administrators have the task of changing the environment. If motivation is lacking, then it is up to the administrators to provide rewards to secure motivation. Even training those who cannot see to see can be furthered by making it administratively apparent that such training is a prerequisite not a deterrent to professional advancement.

What are fundamental reasons for failure to provide the necessary leadership, environment and motivation for non-trivial research? One reason appears to be large departments based partially on the belief that numbers substitute for quality. The typical land-grant, agricultural economics department is so large with respect to both personnel and functions that it is almost impossible for an administrator, even if a competent researcher at the onset, to stay well enough informed on the range of research subjects and methods falling under his jurisdiction to give real research leadership, uniformily over his research program.

In many departments, delegation of the research leadership function results in departmental segmentation which in turn results in stifling rigidities and threatens the control of existing administrators. On the other hand, failure to delegate tends to result in anarchy. Under these conditions distracting and time-consuming, personal competition tends to develop as the number of people reporting to one administrator multiplies beyond the limits of administrative capacity. When such competition develops, objective pursuit of concepts, methods, data and service tend to be forgotten.

Ironically, such competition is sometimes condoned as "good" in the name of *laissez-faire*. Up to this point, the responsibilities of administrators in the problem of size, segmentation and anarchy have been discussed. Lest some self-righteous researcher think the problem is wholly with administrators it should be pointed out hastily that if researchers trained themselves more adequately and more thoroughly disciplined themselves as scientists and mature educated gentlemen, the anarchy and segmentation problems would hardly arise for administrators to handle.

However, as both researchers and administrators are human, the politico—diseconomies to scale in research administration are such that it is tremendously difficult to find that balance in a typical department between segmentation and anarchy which creates the ideal environment in which researchers can be provided with adequate research leadership. Nevertheless creation of such balance by (1) good administration, (2) sincere, mature, cooperative effort of competent researchers and (3) emphasis on our points of agreement on beliefs and values is probably the most important opportunity for improving agricultural economics research in the decade ahead.

INTEGRATION OF ECONOMIC RESEARCH AND PROBLEMS ENCOUNTERED

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UNDERLYING the need for integration in research is the high degree of specialization that has accompanied the remarkable growth in scientific research. Such specialization needs no justification to a group of economists, whose literature since Adam Smith expounds on the advantages of division of labor. Our scientific achievements bear adequate witness to its effectiveness in producing results.

Rather, it is the need or desirability of integration in research that requires justification before this or any other scientific body. By integration, I refer to the pooling of efforts of workers from different specialties for coordinated attack upon research problems. So-called "operations research" is a widely publicized illustration of the approach I am discussing.

The limited degree to which integration is practiced, and the contentment with circumscribed answers to research problems are evidence of the lack of appreciation of the advantages of the integrated approach. Within our own circles we are apt to hear about the limitations of non-integrated research in terms of complaints against other scientists who append unsophisticated economic analyses to research conducted in their areas of inquiry. This should not, however, distract our attention from the proclivity of agricultural economists to handle independently phases of research which representatives of other disciplines could do better. Efforts of agricultural economists to extrapolate biological data in production functions, conduct engineering aspects of cost studies, or handle psychological aspects of consumer behavior studies are illustrative of the fact that we, too, have a tendency to regard the specialties of others as less complex than our own. The consequences are that we not only do some of the research more poorly than the other fellow could have but we also commit errors of analyses and miss relevant factors another scientist probably could have readily seen.

Integration is required to gain full advantage of specialization. Scientists however, have been more adept at dividing research into parts for specialized inquiry than they have been at putting parts of research together into an integrated whole. This seems strange in view of their insistence that scientific theories embody logical explanations of all phenomena within the universes they are intended to embrace.

In practice, the scope of questions presented for research investigation are usually broader than the proficiency of the individual research investi-

gator. They are frequently beyond the scope of operating research units, agencies, or even institutions. So the necessity arises for integrating the activities of specialized individuals or groups to obtain complete answers. Incomplete answers to typical questions presented for research in the complex of agriculture must frequently be regarded as invalid or misleading. For example, an entomologist seeking to answer questions of how to control insect infestation in a food product is of no help if he develops a method that makes the food unsafe for human consumption, unsuitable for processing, or too expensive for sale. He needs the help of other scientists to check these factors before he has a valid answer.

In this context, integration of economic research need not be differentiated from integration of research generally. The challenges and the difficulties encountered are essentially alike. Or, in the sense I prefer to discuss them, they may be regarded as reciprocative inasmuch as the integration of economic research with other types of research presents a more important need than the integration of different phases of economic research.

Deterrents to Integration

Why have scientists been less able to perfect methods of integration compared with means of specialization? Many popular short-cut explanations are given such as scientists are individualists, they are prone to think differently, they are originators, they have confidence in their ability to explore the unknown, they have a touch of genius or peculiar aptitudes that equip them to work apart, they are doers, not managers, they must be free to pursue that which interests their inquisitive minds, or they are inherently intractable to the management or direction imposed by integrated research. Perhaps the most frequent explanation, however, is that they do not receive due credit for their contributions when they participate in group research. There is an element of truth in all of these deterrents to integrated research, but more recondite and deep rooted problems lie beneath the popular conceptions or rationalizations.

It must be recognized that there is greater need for individual initiative among scientists working together than among other types of groups assembled for joint undertakings. Ideas are more likely to emanate from all, or many members of the team than from a single quarterback, manager, or leader. The proportion of scientists to technicians is usually greater in research than managers to employees in business or commanders to GI's in military operations. This observation is especially true as it pertains to basic and theoretical types of research where there is limited opportunity to direct the proficient scientist, so possiblities for integration are limited. Even in applied research, scientists are less

amenable to complete direction than workers in other integrated endeavors. Greater dependence must be placed upon the willingness of the scientist to integrate his activities with those of others. The problem is how to encourage this will.

To induce the will is to overcome indoctrination inculcated during years of scientific training. The training stresses preparation for research in one of the well defined branches of science covering different areas of observation or inquiry for which there have been developed separate sets of principles, languages, literature and techniques. The degree to which this scientific specialization has gone can hardly be over-emphasized, particularly as it affects the training of scientists and their ability to grapple with comprehensive problems. Usually the student obtains a smattering of elemental training in three broad areas of science; namely, the physical, biological, and social sciences. Beyond that he is usually required to concentrate on one or a few of the several distinct branches of knowledge within one of these areas. As graduate training proceeds, he is usually required to focus on one course of study within a recognized discipline and more often than not he becomes tabbed as a specialist within a rather narrowly defined field.

To use our own agricultural economics as an example: Recognize that it should be regarded as one of no less than eight comparable specialties within the field of economics, which is one of the family of social sciences, numbering no less than six. Within agricultural economics we have at least three specialties having the distinctive characteristics with respect to training, literature, and methodology as well as subject matter. Moreover, within each of these there is a marked tendency toward further specialization. For example, agricultural marketing tends to break down commodity-wise into a minimum of some five major groups.

Individual scientists molded into this scheme of specialized research become ill equipped to independently solve agricultural problems. They perforce deal with phases of problems, solution of the whole being dependent upon successful research on several phases. This suggests the need for integrated research with scientists from several disciplines pooling their efforts to solve different phases of a problem simultaneously. Yet, the most common type of integration in agricultural research is intradisciplinary rather than interdisciplinary. This tendency is shaped by the educational institutions, the professional societies, and the scientific research agencies—all aiming toward the facilitation of specialization.

Research Training

The combination of research and education in the institutions for graduate study tends toward the segregation of scientists and teachers into

subject-matter departments within universities. Graduate study is often combined with research or other staff employment. Social as well as professional ties draw the student closer to his discipline as he learns that his advancement is influenced by his relations with his associates, his professors, his department head. Accordingly, his allegiance becomes primarily identified with his department of the university rather than with the university as a whole in professional, as contrasted with athletic, matters.

A part of the indoctrination involves impressing upon the student the importance, if not the omnipotence, of science with special reference to his particular branch of science. His early research tends to fit into a prearranged pattern molded under the leadership of a major professor or department head who is supreme within his domain and who usually exhibits little interest in sharing or integrating his domain with others.

Along with a specialized course of study, the science student acquires a specialized vocabulary. Presumably in the interest of concise expression with precise meaning, he is taught a vernacular best understood by his close professional associates but difficult for scientists in other branches of science to follow. This and the proclivity of economists to cover whole worlds of meaning by referring to theories or concepts by the names of men who develop or espouse them becomes a major obstacle to integration of research. A veritable bulwark against intercommunications arises from this practice.

In fact, a hallmark of leadership in ecomonic research seems to be an ability to establish a distinctive jargon that is accepted and employed by disciples. The distinctive language has the further characteristic of an aura of mystery to all others except the avid readers of the publications by the master and his disciples. Even this approach to comprehension meets with limited success as evidenced by the number of rejoinders to criticism appearing in professional journals based upon the proposition that the critic did not understand the original article.

Professional Societies

As the processing of a budding scientist proceeds, he finds that he is dependent upon recognition of his scientific contributions for a measure of his compensation. He further learns that the number of professional associates who can follow his language or assess the significance of his research is limited. So, he becomes highly dependent upon his professional society to provide journals for his publications, platforms for his oral presentations, and audiences capable of comprehending his accomplishments. In short, his professional reputation and career are closely tied to his society. Accordingly, his reluctance to participate in research not

related to or countenanced by his society grows apace. He prefers not to engage in integrated work that might detract from close associations with fellow research workers in his own profession.

Public Research Agencies

The influence of the training and the professional associations extends to the organizational patterns of public research agencies likely to attract the services of qualified scientists. These agencies tend to establish organizational units oriented about the different branches of science. The growth and development of scientific research in the Federal Department of Agriculture is a case in point. Recent reorganization of the Department also illustrates the degree of resistance encountered from scientific groups when administration of research departs from these patterns as a means of implementing integration.

Without trying to pass judgment on the wisdom of the changes, mention of some dissenting views that have been expressed may serve to point up difficulties of integration. The argument is made that a scientist must go to several agencies within the Department before he can obtain a comprehensive view of what is being done in any branch of science. The counter-argument is that a farmer or business man must otherwise contact several agencies to find out what research is being directed toward problems that concern him and is then left to his own devices to figure out how the parts relate to each other.

It is contended that development of a science such as entomology or agricultural economics has paralleled the growth of corresponding specialized units within scientific research agencies such as the Department of Agriculture and that this correlation is not accidental but causative. The counter-argument is that this is true up to a point, but that sciences reach a stage of growth where they must be integrated to make their maximum contribution, or to broaden the fields of opportunity for their adherents. Chemistry is cited as a case where the scientists have long since become acclimated to working in intimate association with, rather than in units apart from, other types of scientific specialists. Chemistry societies have adapted their journals, abstracts, and services to accommodate membership with wide interests. Consequently, chemists find more opportunities for employment and advancement.

It is pointed out that job classifications incorporated in Civil Service registers and regulations require the establishment of specialized scientific units or agencies, if research workers from the respective sciences are to maintain their identity for effective recruitment, and for advancement into the higher-paid echelons of administration. This argument has considerable merit because the regulations have been drafted to fit the past

organizational pattern, but it can be further argued that regulations can be modified to fit an integrated pattern so that every type of scientific training will receive equitable consideration in the competition for leadership positions. There is reason for confidence that leadership can still be recruited from the ranks of scientists and that we need not accept at face value the contentions frequently encountered from applicants for top jobs that they know how to direct research even though they don't know how to do it, or that training in management is more important than training in science. Management functions are subject to integration along with research functions.

Argument is also made that an integrated research agency will tend to be distorted to emphasize the branch of science from which the leadership comes. This may be regarded as no new problem but simply a different aspect of a problem encountered in non-integrated research agencies as well, where management tends to favor work with which it is most familiar. The responsibility for more diverse activities that naturally accompanies integrated research organization may make an administrator more conscious of his obligation to avoid this shortcoming. Moreover, attitudes toward scientific partisanship would doubtless be a factor in selection of leadership for integrated research.

Workshops

Discussion of causes of problems encountered in efforts to integrate research is intended as prologue for examining ways to facilitate integrated research. Many of my observations of the problems have come from agricultural marketing workshops where physical, biological, and social scientists have been brought together for joint discussions in the hope of encouraging integrated research. This approach is based upon the proposition that agricultural marketing is not a science in itself, but that research in marketing must apply principles and techniques derived from a number of branches of science. A packaging problem, for example, may involve physicists to test strength and durability of containers, physiologists to ascertain the atmospheric conditions required to preserve the commodity to be packaged, entomologists to prescribe against infestation, economists to study costs and prices, and psychologists to determine consumer responses to alternative sizes, colors, or forms of the packages. Such a workshop serves mainly to reveal opportunities for useful integrated research rather than to implement it.

Out of experience with these workshops I have acquired two convictions. One is that the facilitation of communications between different kinds of scientists is a serious problem. Proximity to each other is not a solution in the sense that you can lead a horse to water, but you can't make

him drink. Researchers from different branches of science do not enter into joint discussions eagerly because on first exposure it may take days of almost continuous palaver for them to comprehend each other's terminology and recognize mutual interest in scientific problems. Also there is need on occasion to reconcile divergent views of ultimate objectives of research which are cast in different light with broader perspective. I have seen repeated instances where antagonism has changed to enthusiasm when these obstacles were overcome.

The second conviction is that administrators are greater handicaps to integrated research than the research workers, where more than one department or agency is involved. The researchers can be impressed with opportunities and advantages of joint work, while the administrators are still more impressed with budget limitations and what they regard as their primary obligations within their own jurisdictions.

Private Research

Private research has gained a reputation for greater success with integrated research than public research. To the extent this observation can be substantiated, it may be attributed to several factors. In general, private research incurs a relatively greater measure of anonymity. Compensation is more in the form of monetary returns. Pride in the commercial firm or in association with the private research institute is frequently nurtured to bolster confidence in professional status. The acceptance of less public or professional recognition alleviates the problem induced by scientists striving to do independent work for publication.

Private agencies direct more of their resources to applied research. Within operating companies, practical problems are brought to the research workers, usually with a greater sense of urgency for prompt solutions than in academic or public agencies. Problems of concern to the management are most likely to receive precedence, and funds and facilities in keeping with the gravity of the problem are more likely to be provided. Moreover, the profit motive is frankly acknowledged, and research workers may be accorded opportunities to share the benefits of successful results, or they are put on notice that continued compensation is unlikely to be forthcoming with successive failures.

In both operating companies and in specialized research companies hiring out under contract, teams of varied research workers are more likely to be fitted to the problem than the converse. Some of the most successful firms conducting research on a contractual basis are located on the fringe of college campuses from which the teams are recruited as the jobs arise. Scientists who do not normally work together on the campus are brought together just off the campus where the pay is for specified

joint work and nothing else. Prerogatives and discretion exercised in the academic environment are quickly overcome through this device, and the firms are quick to point this out to prospective clients.

Competition is inevitable in private research even though it involves duplication and overlapping. Public research agencies in agriculture cannot afford to use this method to gain advantages of either incentive or integration.

Operations Research

Within recent years a distinctive research activity labeled "operations research" has been developed for the expressed purpose of integrating the contributions of different kinds of scientists to deal with specific problems. Operations research employs a number of worth-while methods for integrating research. The best known operations research results have emanated from teams of scientists intentionally recruited from widely varied backgrounds of knowledge, training, and experience. The only common denominators among the participants are a grasp of mathematics and an understanding of research methods. Common characteristics of the work include: (1) the team deals only with pragmatic operating problems; (2) it reports only to top management; (3) it has free reign to observe or inquire into any phase of operations; and (4) it confers with and draws upon the experience and ideas of employees of any rank. Operations research practitioners and proponents are quick to acknowledge that they have not originated new methods of scientific procedure other than new ways of applying what is known to problems needing solution.

Operations research avoids partitioning of research into compartments corresponding to types of science. The units are teams assigned to given problems. Heterogeneous rather than homogenous groups are assembled for joint inquiry. This is in contrast with the regional technical committees that have been established in agricultural research in recent years to facilitate integration between independent public agencies. Problems of this approach to geographic and agency integration for research in subject-matter areas have received attention in American Farm Economic Association meetings on several occasions so no attempt is made to treat them in this paper.

Summation

By way of summing up it appears to me that consideration of ways and means to obtain more integrated research, combining the efforts of scientists from different disciplines, is appropriate in our agricultural research programs. In fact, it is necessary to realize the full benefits of specialization. As things now stand a large share of the job of correlating

or combining research results coming from widely separated branches of knowledge is left to farmers or other recipients of research. To some extent economists function as integrators of research results emanating from different sources by translating them into productivity, cost or returns potentialities or consequences. As long-time advocates of division of labor and as interpreters of research results, I feel that economists should be quick to recognize the advantages of working with other specialists and should take the lead in arranging integrated research.

It also appears to me that economic research was not heretofore integrated with other types of research to the degree involved in the recent reorganization of the U. S. Department of Agriculture because public research has tended to follow the organizational patterns of institutions that combine teaching and research. Under the influence of advisory committees, oriented about commodity and functional interests, Federal agricultural research will be directed more toward the treatment of comprehensive problems. The previously-established organizational pattern was less amenable to the treatment of the broad problems now brought systematically and effectively to the Department for research attention. The new pattern incurs risk of subordinating basic research unless the advisory committees are induced to advocate provision for it.

To gain confidence and support for greater freedom in research, better methods for integrating research on broad problems are needed so that lay advisors may acquire greater respect for scientists' ability to organize their work.

The problem of integrating varied and complex activities in large organizations is not peculiar to modern science. It has been successfully surmounted in military, business, and other endeavors. Public research agencies, however, cannot utilize the chain-of-command system of the military where those in the ranks are but to do or die, nor can they resort to the profit motives or competitive incentives to the degree available to business. They must seek more subtle ways to create the will among different kinds of scientists to participate in joint research.

Problems encountered include: (1) facilitating communication between different kinds of scientists; (2) promoting mutual understanding and respect for what other sciences have to offer and the desire to draw upon their services instead of trying to do the other fellow's work one's self; (3) enabling scientists to pool their efforts to advantage without obscuring their professional identity or impairing their relationships to separate professional societies; and (4) devising research management methods to permit greater flexibility in arranging joint research between organizational units.

There is no clear-cut best way to organize research. Neither is organiza-

tion the key to good research. Poor organization can be overcome where the ability and the will are present. Good organization can influence the nature and direction of research toward integrated as contrasted with independent research. I don't believe, however, any organization can completely solve such problems as how to draft research projects without regard to administrative lines of responsibility, how to induce administrators to readily relinquish or share directive controls to ease the way for integrated research, or how to avoid visits my administrative superior claims to get almost daily from one or another of his unit leaders complaining about other units working on ideas he is supposed to have.

DISCUSSION

EARL R. SWANSON
University of Illinois

Dr. Trelogan has enumerated some of the problems in research integration and has explored some of the problem causes. He also indicates that economic research has not previously been integrated with other types of agricultural research to the degree involved in the recent reorganization of the U. S. Department of Agriculture. It would seem that an evaluation of an organizational structure should be dictated by a consideration of the fundamental purposes of research integration. Trelogan mentions the marked degree of specialization among research workers and its effect on the training of scientists as a dominant factor underlying the need for integration, such need arising because of the inability of individual workers to cope with broad agricultural problems. In this discussion I shall not outline what I believe to be an ideal organizational structure for integrated research, but rather I should like to indicate the general purpose of the integration of scientific inquiry in agriculture as well as some additional obstacles to integration.

In a discussion of integrating agricultural economics research it may be useful to visualize it as taking place in two directions. In one direction we may conceive of integration of research in agricultural economics with that of its parent discipline, economics. This type of integration involves drawing on the relevant body of economic theory in developing hypotheses for test. In short, integration of this nature leads more directly to the solution of a research problem. This type of integration is not so dependent upon the organizational structure and the personal characteristics of research workers that Trelogan's paper emphasizes. Rather, this type of integration comes primarily through appropriate training.

In the other direction we see integration of agricultural economics research with inquiry in the technical areas of agriculture. Here the peculiar role of economics as a coordinating discipline is of special importance. Thus, it is not so much a matter of economics being integrated into other types of agricultural research as it is of economics being the integrator itself. If we look at the objective of scientific inquiry as that of discovering better ways by which society may attain its ends, even the rather unsatisfactory body of welfare economics provides at least a partially unifying interim framework for solving

problems in the applied phases of agricultural research. This is not to imply that the choice of problems, as contrasted to their solution, can readily be determined by reference to economic theory. The question of which problem to solve is usually outside the scope of economics. However, since material ends rank rather high in the value system of our culture, economic analysis should give important clues concerning relative importance of problems. Once the problem has been selected, economic analysis should aid in clarification of objectives and specification of data needed for solution. Thus, the very essence of economics as a coordinating discipline would need to be considered in developing of an administrative structure that will foster integrated research.

In enumerating the deterrents to integration mention should be made of the suspicion sometimes found on the part of technical specialists of the so-called "economic expert." Agricultural economists have the task of demonstrating to our colleagues in engineering, agronomy, animal science, and other applied areas of the agricultural industry, that economic analysis has something more fundamental to contribute to problem solutions than the mere multiplication of physical quantities by unit prices and costs. On the other hand we must accept the burden of at least becoming familiar with the technical phases of agriculture. In its early years our profession was composed primarily of men with a technical orientation. There is a danger in swinging to the other extreme and adopting a belief that those engaged in agricultural economics research can dismiss from interest a wide variety of problems simply because they are what is usually termed "technical."

Viewing agricultural economics as the provider of a framework for decision-making by farmers and others, it can be seen that research purporting to answer questions of "how" may require equally as much economic analysis as research pertaining to questions of "how much." For example, plant and animal breeding work is characterized by multiple objectives, the relative importance of which must be evaluated in some fashion. If all the desired characteristics of a plant or animal were complementary, the agricultural economist would have little to contribute. However, it is more likely that desirable characteristics are substitutes. For example, corn yield is probably sacrificed as the period from planting to maturity is shortened by the plant breeder for protection from an early frost. By placing the problem in a broader context, the agricultural economist should be able to aid in determining a better notion of an optimum combination of yield and maturity date.

Finally, the problem of exchange of raw data between agricultural economics research workers and those in other fields needs to be mentioned. The flow of information is, in general, more toward us than away from us. However the flow is not automatic; we usually have to search for data and may find it inaccessible due to the fact that it is in language that we cannot interpret. Or although it can be understood, it was not collected in such a fashion that permits economic evaluation. In the agricultural research area, the economist might well have a role similar to that of the consulting statistician in the design of technical experiments. The personal characteristics of research workers that Trelogan's paper mentions are quite important in exchange of data. Under most conditions workers in public institutions need to abandon the notion that research material collected by them is their personal property. Fear that the data may be misinterpreted might possibly be dispelled by having the research project integrated from its inception.

THE USE OF MATHEMATICS AND ECONOMETRICS IN OUR RESEARCH WORK*

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SINCE the various definitions of econometrics[1] that are commonly used involve the application of mathematics and statistics to economic problems and since statistics is largely mathematical, it may be a useful simplification to direct this discussion mainly towards uses of mathematics in our research work. I include in our research both highly theoretical and intensely practical inquiries along with various intermediates and mixtures.

Uses of Mathematics

I should like to enumerate some uses of mathematics, recognizing that the different uses listed are closely related and the distinctions may seem somewhat artificial. First consider mathematics as a means of communication. In any given instance there are several criteria for choosing a particular language—mathematics or any other. The ones that seem to me to be important are simplicity of expression, precision of expression, and the receptiveness of the intended audience to messages in various languages. These considerations sometimes operate in favor of mathematics as against, say, English or German and sometimes in favor of a non-mathematical language.

The familiar theory of the firm is perhaps as good an example as any of an area in which the simplicity of a mathematical formulation is apparent and, indeed, good verbal expositions tend to consist mainly of sequences of mathematical statements in an awkward medium. On the other hand, even advanced mathematicians would rather hear or read the papers of the present session in their present literary form rather than have them translated into mathematics. Unless the papers were examined carefully, there would not even be any guarantee that this could be meaningfully done with existing mathematics.[2] Many realms of mathematics are undeveloped and verbal discussions doubtless enter these realms at times, though perhaps with more confusion than in more familiar areas.

The relative precision of mathematics and other languages in various contexts needs to be examined with care. Otherwise too much may be claimed for mathematics on this score. While it can hardly be disputed

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[1] See Gerhard Tintner, "The Definition of Econometrics," *Econometrica*, 21:1.

[2] See Kenneth J. Arrow, "Mathematical Models in the Social Sciences," Ch. VIII of *The Policy Sciences*, edited by Daniel Lerner and Harold D. Lasswell, Stanford University Press, 1952.

that mathematical languages furthers precision, i.e. correctness and absence of ambiguity, at an abstract level, its use does not guarantee empirical precision, which I would associate with ability to predict. Mathematical economists are often accused of being quite unaware of the need for valid links between abstract arguments and observed realities. A guess as to the proportion of cases in which such accusations are warranted would be highly prejudiced so I merely observe that the accusers sometimes fail to take into account the advantages to be gained from division of labor. This is to say, a person may appreciate the need for doing a job without aspiring to do it himself. More will be said later about division of labor.

On the use of mathematics as a means of communicating with particular respondents, the obvious group is mathematicians. A specialized mathematician quite properly feels that his time is being wasted if he is forced to review all of the circumstances of an application and to labor over the ambiguities of essentially mathematical concepts in clumsy verbal form. On the other hand, most mathematicians are quite interested in applications of their field and are willing to advise on various mathematical problems if they are presented mathematical problems rather than problems in agricultural economics, botany, or chemistry. Of course, individuals differ in their abilities and patience outside their specialties, but the above is a fair generalization.

In addition to familiar national languages and mathematical language we are often confronted with the technical jargons of the various sciences. These arise in response to the needs of various disciplines for more precision and simplicity than are furnished by the vocabularies of ordinary conversation. In several respects they seem to lie between mathematics and ordinary discourse. Agreements are reached that certain words shall symbolize special concepts. These words become more precise, are shorn of part of their ambiguity. Convenient expressions arise for often used relationships. Many of the terms become, in effect, highly abstract symbols differing from mathematical symbols mainly in that their sound or appearance helps suggest the empirical phenomena to which they relate, and their status as words permits them to be used along with words from the lay vocabulary.

A special jargon is a great aid to communication among workers within a field and, at the same time, a fairly effective barrier against those outside. Except for those who have mastered several jargons, communication between disciplines must rest on lay language or, alternatively, mathematics.[3] Through mathematics, workers in different fields may directly exchange

[3] Professor Robert Thrall of the University of Michigan has frequently stressed the importance of mathematics as a common language of the sciences. His observations arise partly from experience with Michigan's Interdisciplinary Research Seminar.

abstract results and compare the formal structures of various disciplines. Mathematics does not directly reveal the empirical content of a discipline but may be a substantial aid since knowledge of the structure of a field of inquiry tells how the empirical concepts must be fitted together.

In addition to these various uses of mathematics as an aid to communication, mathematics is also useful as an aid to reasoning. Mathematical experience helps one construct valid logical sequences relating conditions to desired logical consequences. Mathematical literature contains a vast number of proved results. When a researcher needs to investigate conditions that are formally equivalent to conditions that have been explored by mathematicians, the results are available. If we make the traditional distinction between inductive and deductive inference, then the above remarks pertain to the later.[4] The most successful systematic way of incorporating inductive inference into our research is furnished by statistics and its dependence on mathematics is well known.

The enumeration of four uses of mathematics has not provided us with a neat separation of logically distinct categories. A few indications of close connections between different uses may suffice to illustrate this. Simplicity of expression and receptiveness of various audiences are closely related, most people being willing to become familiar with a new idea or approach if it can be made sufficiently simple. Simplicity is often a very important contributor to successful pieces of reasoning. an appropriate notation may make the difference between ability and inability to attain a correct result. Difficulty in adding long columns of Roman numerals provides a ready example of this connection. In using mathematical results in our reasoning, we necessarily establish communication of a sort with mathematicians so these uses are not altogether distinct either.

The uses listed correspond reasonably well to needs that may be uppermost in the research worker's mind on different occasions and it is well to note that recourse to mathematics may, on the several occasions, be motivated by somewhat different considerations. Arguments that mathematics is not helpful in a selected instance are often concentrated on the denial of one or another of these uses with no consideration given to other possible contributions.

That mathematics does make some contribution to our research seems sufficiently generally accepted to not require additional discussion or debate. Differences of opinion about its usefulness in particular areas may reasonably be expected but there is doubt that they can usefully be

[4] For further remarks on deduction in a similar context see Paul A. Samuelson, "Economic Theory and Mathematics—An Appraisal," Papers and Proceedings, *American Economic Review*, v. XLII, n. 2 esp. pp. 57, 58.

brought into a general discussion such as this. Superficial examinations and conclusions would be of little value. Furthermore, nearly all negative conclusions that might be reached would necessarily be tentative. It is almost always conceivable that a different formulation or manipulation will extend mathematical analysis to a new area. Occasionally an impossibility theorem can be established, but most empirical problems admit of several formal approaches so a demonstration that one approach will not lead to useful applications does not preclude other formulations of the problem.

Thus the problem of production adjustments within a firm can be analyzed using either a linear programming model or a traditional model based on a continuous production function. With sufficient data either model would represent the problem to a close approximation and implications of the two models should also be approximately the same. The programming model will usually be better suited for examining the implications for internal adjustments of production practices. The traditional model is ordinarily more convenient for examining the market behavior of producers. Another example of alternative formulations of a given problem is furnished by the different approaches to welfare orderings that have followed Arrow's demonstration that certain conditions which he proposed precluded the possibility of a satisfactory ordering.[5]

Problems Encountered in Using Mathematics

Consideration now should be given to some problems that we encounter in trying to make efficient use of mathematics in our research. This will consist mainly of statements of my own opinions as to what the problems are and what we should do to meet them. I shall not spend much time trying to substantiate these opinions but I believe they are consistent with those held by many experienced research workers. The central and often difficult feature of a successful application is that someone must grasp both the essential features of the problem and the relevant mathematics. This can be accomplished in a variety of ways. The applied research worker may know sufficient mathematics to proceed entirely on his own. If not, he may be able to formulate the essentials of the problem in a concise abstract form so that the mathematical questions posed can be readily seen by a mathematician who can then indicate what is known or can be ascertained about solutions, the information then being interpreted by the researcher in his practical context. A third alternative would be to have a mathematician become sufficiently familiar with the practical

[5] Kenneth J. Arrow, *Social Choice and Individual Values*, John Wiley & Sons, 1951. Several subsequent proposals are cited by James M. Buchanan in "Social Choice, Democracy, and Free Markets," *Journal of Political Economy*, v. LXII, 2.

context to formulate the problem abstractly and interpret the mathematical conclusions. Each may be most convenient on particular occasions.

Difficulties may arise either through complex mathematics or difficult questions of formulation and interpretation. For difficult mathematics, one just has to try to find a sufficiently able person in the appropriate branch of mathematics. For problems of formulation and interpretation, either the applied worker or the mathematician must step somewhat outside his accustomed field. Typically there is some resistance on both sides to doing this and this is frequently where matters rest.

Such situations suggest an alternative to the procedures indicated so far. An intermediary could sometimes be used to aid in formulation and interpretation and, in some cases, he could also handle mathematical problems. Intermediaries are, of course, being used. While some of these might be called econometricians, the most numerous group are our consulting statisticians attached to various experiment stations, statistics departments, statistical laboratories, statistical institutes, economics departments, mathematics departments, sociology departments, agronomy departments, and wherever else a bit of budget and tolerance can be found. In view of the universality with which it is proclaimed that mathematics is a language, it is a little surprising that language departments are the principal group excluded.

Now some of my best friends derive part of their livelihood from being intermediaries, so I want it clearly understood that this is among the most virtuous of activities. For this reason as well as the fact that using intermediaries is sometimes the most efficient way to shed light on practical problems, I do not want to discourage their use unduly. However, I do feel obliged to caution against placing excessive reliance upon them.

Certain costs of proceeding this way are obvious. Our intermediaries, like other middlemen, charge something for their time. This cost might be viewed either in dollars of budget or in work foregone by having well trained people engage on other people's problems. An additional channel of communication is needed when an additional person participates; this may involve loss of information in transmission or more complex personal relations. These have, of course, to be compared with advantages to be gained. It would clearly be rash, however, to assume that, whenever a particular role can be distinguished, it will necessarily pay to have a specialist fill it.

In particular, it would be unfortunate if reliance on consulting statisticians and econometricians lessened our efforts to strengthen the mathematical preparation of all of our research workers. Though use of mathematics should remain a subsidiary part of their activites, I am convinced that there are many unexploited applications where use of mathematics

will return more than its cost and that, in many of these cases, the cost will be minimized by investing more in the general basic mathematical training of our research workers. This will enable them to handle more problems themselves and will make their contacts with mathematicians and intermediaries more fruitful.

Training for Our Students

The main long-run task in achieving this generally better background is to provide suitable training for our students. However, it will also be quite helpful if we can remove certain misconceptions and superstitions which sometimes make both our students and our established research workers reluctant to use mathematics. Many people seem to have a neurotic fear of unfamiliar symbols. The introduction of a new symbol seems to raise a psychological block which prevents further thinking. About all that some people are willing to do in such a situation is to complain that the problem has been made too abstract. I am convinced that it is really unfamiliarity and not abstractness which is the main cause of this reaction. We all use words and numbers in highly abstract senses and, because of long familiarity, this seems quite natural. If this diagnosis is correct, then experience is a good antidote for unfamiliarity and willingness to acquire a little experience will do much for even those people who are too busy to undertake extended study.

Another view that creates unnecessary inhibitions is that mathematics applies only to quantitative measures. Logically, the handling of numerical quantities is only a small part of mathematics.[6] It is the part that has been explored most thoroughly and, until recently, was the only part that non-mathematicians knew much about. Non-numerical branches of mathematics (e.g. set theory, topology, lattice theory) are undergoing substantial development and finding useful applications. Perhaps the best economic illustration is the work by Arrow on social choice previously cited.

On matter of training our students, it seems to me a reasonable goal for the immediate future to try to give every agricultural economics research worker elementary calculus (differential and integral) and an introduction to modern algebra. The calculus would enable the student to get the minimal introduction to statistical theory (say at the level of Mood or Anderson and Bancroft) and to have some contact with traditional mathematical economics. Statistics is a continuously developing field and a knowledge of methods alone does not enable a research worker to evaluate and apply new ideas and techniques. Modern algebra would also be a

[6] For an elementary discussion of mathematical logic see Alfred Tarski, *Introduction to Logic*, 1941.

substantial help in statistics; it would consist mainly of an introduction to matrices and vectors and to some of the fundamental and not necessarily quantitative aspects of mathematics. Some understanding of modern algebra is already essential for a good understanding of linear programming or utility theory. Insofar as we are ever able to foresee future developments, we can say that they will increase the importance, relative and absolute, of this area.

A fortunate aspect of undertaking this program is that it can be done at the undergraduate level. Chronological maturity does not seem to be an important contributing factor in learning mathematics. As things stand, our students often get such math training as they do undertake near the ends of their graduate programs when it is too late for their instructors to integrate it with other parts of their training. Putting this minimal training into the undergraduate program would thus increase its value, since some training in application could be added at the graduate level, and would reduce its cost, since the courses replaced would generally be of less importance.

DISCUSSION

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Dr. Hildreth has given us an interesting paper with which I am in complete agreement. I believe that I can best utilize the time allotted to me by supplementing his comments by one of my own experiences.

Hildreth said, "The central and often difficult feature of a successful application (of mathematics to research) is that someone must grasp both the essential features of the problem and the relevant mathematics." He goes on to suggest that in some cases an "intermediary" can aid in the formulation and interpretation of the problem. I have recently been functioning as such an intermediary and believe that a description of my activities may be enlightening to the group.

For several years a Technical Committee of the Western Regional Deciduous Fruit Project has been considering ways in which information might be obtained, based on sales from retail stores, on (1) the effect of specified quality factors for individual fruits on quantities sold and (2) elasticities and cross-elasticities of demand after allowing for the existing quality. Considerable work along these lines has been done based on experimental studies but relatively little has been based directly on sales resulting from normal merchandizing practice.

I came into the picture after data had been collected from 2 retail stores in Denver on a pilot study basis during the summer of 1952. Data were collected by days during a 10-week period on volume of sales, price, extent of display space, color, ripeness, condition, size, and method of display for each fresh fruit sold at any time during the period. Daily sales of each item were divided by the value of total sales of all fruits to eliminate factors asso-

ciated with over-all store traffic. The quality factors were rated on a scale ranging from 1 to 9, with most ratings falling in the 3-7 range. Many color pictures were taken to ascertain whether a uniform rating system on qualities could be developed. I was asked to assist in deciding whether to carry out a full-scale study and, if so, to suggest modifications in the way in which the data were to be obtained and possible methods of analysis.

Following a 2-day conference with the Committee and considerable analysis of the data from the pilot study, I recommended that the full-scale study be made but that the methods of measurement of the specified quality factors be modified so that each would be based on objective ratings of physical characteristics instead of on an estimate by the researcher of what the consumer wants. I also suggested that an attempt be made to provide an over-all "appearance" rating for each fruit.

My next contact with the study came after data had been collected from 12 supermarkets in Denver during the summer of 1953. Some preliminary analysis of the data had been done by one of the men working on the project. I spent a full day with the Committee listening to a description of the way in which the sample of stores had been drawn, of modification in the study since the pretest, and of results of the analysis of the new data. Color pictures again were shown to illustrate examples of the various maturities, colors, defects, etc. on which the quality ratings were based. As I looked at these and listened to the discussion, it became clear to me that some way had to be found by which the composite quality illustrated by the pictures could be translated into mathematical terms and incorporated into the statistical analysis.

I wrestled with this problem over night and came up with the following solution. From a mathematical standpoint, I felt that we were dealing with an "appearance matrix," since a matrix is a composite set of numbers having the property that if we change any one of them we have a new matrix. That was the nature of these data—if any one of the quality factors was changed, the appeal of the fruit to the consumer was changed, yet it was the composite as a whole that affected his decision to purchase. It seemed to me that we were dealing with 4 major appearance factors—ripeness, color, defects, and the way in which the display was maintained—and that each of these could be considered as having a negative, a positive, or a neutral effect on the consumer. This could be written in a matrix notation in the following way:

Quality factor	−	Neutral	+
Ripeness	Hard	Firm	Ripe
Color	Low	Normal	Extra
Defects	Excessive	Normal	None
Maintenance	Poor	Normal	Extra

Figures would be inserted in the first 3 rows representing the percentage of fruit in the display falling in each of the cells such that the sum of the 3 columns of any row would add to 100. A check mark would be used in one of the 3 columns in the last row. In discussing the results of the study with producers, a color slide could be placed on the screen and the corresponding quality matrix written on the blackboard. A second slide could then be shown, together with its quality matrix. The statistical analysis would indicate the difference in quantity that consumers would take at a given price of the two qualities or the difference in price required to move a given quantity of each.

A change in any one of the figures or checks would imply a different response by consumers. The Committee seemed to feel that this was a useful expository concept despite the fact that none of them had known precisely what a matrix was prior to my discussion.

When I checked this approach with Glenn Burrows, a mathematical statistician on our staff, he suggested that the statistical analysis could be handled by a standard analysis of covariance approach by using as separate variables the data from any two of the columns in a given row, since the third column was known given any 2 of them. The matrix approach, however, would still be useful in explaining the results to producers and handlers since once a figure had been assumed for any 2 of the columns, the third would be immediately implied.

I have gone into this example in some detail because I think it helps to tie down some of the material included in Dr. Hildreth's paper, particularly as to the role of an intermediary. Few mathematicians would have been willing to spend the 4 days required to give me an understanding of the problem. On the other hand, the applied research workers who were involved in collecting and analyzing the data would have been unlikely to come up with a solution of this kind even if they had had a course in matrix algebra. I heartily agree with Hildreth's suggestion that all potential research workers be given courses in calculus and modern algebra but I would also urge that general econometricians be retained on research staffs whenever budgets permit this seeming luxury.

IMPROVING AGRICULTURAL ECONOMICS TEACHING

Chairman: G. B. Wood, Oregon State College

SOME OBSERVATIONS ON TEACHING

HERRELL DEGRAFF
Cornell University

WHEN I was asked to discuss Major Opportunities for Improving Teaching in Agricultural Economics, I tried to pass the ball to some other member of the Association. It seemed better to be silent and leave some question about the paucity of my ideas than to speak and remove all doubt. The program chairman proved to be the better salesman, so I do not have that choice.

What was the program topic meant to embrace? It might logically cover curriculum, but I choose to by-pass that problem. It must then relate to teaching methods. But two other papers on teaching techniques are to follow. Therefore I shall confine myself to "some observations on teaching"—points I believe to be of major importance to those of us who meet students, especially undergraduate students, in the classrooms.

Teaching is as old as human thought—though perhaps it has not improved much since Socrates. Yet many of us share the privileges and responsibilities of teachers, and surely in these circumstances each of us has given serious thought to improving our results. Professionals in the field of education have filled many shelves with their findings and erudition, and yet, sadly, I have obtained relatively little from them, consciously at least, that has helped me to be a better teacher. Thus the views I shall express are strictly personal. They are by no means definitive, and are certainly open to debate and disagreement. I am purposely presenting my points in a manner as debatable as possible, since this is the way we should get the most out of this session.

Perhaps the fault is wholly mine that I have acquired little of teaching skill from professionals in the field of education. Or it may be, as I believe it is, inherent in the nature of teaching and learning. The fact is (or it seems to me to be a fact) that teaching is not a science, subject to the hard and fast rules of scientific procedure. Nor can it be. I personally would lay down few rules for a teacher except; "Keep your voice audible"; "Keep the room temperature something below 80°"; "Don't make the seats too soft"; and, "Be enthusiastic about your subject and your opportunity."

Good Teaching Facilitates Individual Experience

Learning is an individual experience. That is a truism. And I submit that teaching is a corollary of learning, and just as individual. The supposedly bad English usage, "He learned me something", actually may not

be so bad. At least it emphasizes a relationship I wish to isolate. The good teacher is an artisan. He plays upon the intellect of his pupil. He is the leader to be sure. But he is the leader in a joint exploration. Instruction does not have active and passive components—though some drowsy classrooms would convey that impression. Teacher and pupil (and note that pupil is presented in the singular) are participants in a joint pursuit of facts, and hypotheses, and interrelationships, and understanding. I believe the ideal relationship between them is that of an association of two *learners.*

One of the most effective teachers I ever had never lectured and I never heard him give a direct answer to a question. He asked questions, and he answered a question by asking another. In fact, I have had two such teachers. And no other ever had me scurrying off to the library in hope of reducing my ignorance to anything like the same degree as these two. I studied, and I thought, because I did not want their next questions to trap me. These two men stand out in my mind as abundant proof that the Dr. I. Q. kind of teacher who has all the answers may not be most stimulating to students. In fact, I think one of the worst things we can do to the motivation of young minds is to imply that we have all the answers. I remember any number of undergraduate courses, particularly, in which that was the implication. And my reaction was, "Why study this?"—which I am sure was also the reaction (with all the lack of stimulation that implies) of many fellow students. Far more stimulating was another professor who seldom made categorical statements. His habit was to say, "We now think this is true." This at least left the student with the privilege of wondering if it were true, and perhaps some motivation to find out.

None of this means that I try to teach in the manner of any of my own respected teachers. Certainly they have been an influence and have left their mark. But if teaching is as individual as I believe it is, efforts to standardize methods are quite likely to be wasted. Teaching results would be much sadder than they are today if any attempt were made to pour all teachers from one mould or even several. Any young teacher who starts out emulating someone else will likely find the harness ill-fitting until he has devised his own. But one thing I do hold to be of utmost importance. That is, that the teacher himself shall continue to be *a learner with his students.*

Teaching has been said to be "a function of ignorance." Pushing back that ignorance through joint quest by both instructor and pupil is, I believe, the essence of good teaching. How often a young teacher, though his experience be slight and his skills yet to be polished, has stimulated his students by the very freshness to himself of the ideas he would convey and by his spontaneous enthusiasm. I would submit that older men who have continued to be good teachers have remained young in this sense. At least two characteristics are outstanding in such men. First, they have the

skill to make an idea as sparkling in the hundredth presentation as when it first dawned upon their consciousness. Second, and more important, their own quest for knowledge does not dim. They continue to be *learners*, and participate in an association of learners with their students. The only attitude conveyed to students more quickly than enthusiasm is boredom. The bored teacher ought to take that job he talks about that would pay him twice as much.

An obvious reason for continuing to be learners is that we never know how much of what we teach is true, and how much is untrue. Some presumed truths which we elaborated in detail on examination papers in my undergraduate days now repose quietly beneath the weight of new presumptions. That pertains to practically every discipline. We can only know that any concept is merely the best distillation of our intellect and understanding at the time we offer it—but what more is to be asked if we have continued to be learners with our students, and in that mutual experience have primed the generators of their own thinking?

Don't Parrot the Textbook

Another observation is the deplorable situation in which the teacher would be out of business except for a textbook. I realize this may be hitting below the belt for some overloaded and hard-pressed teachers. On the other hand, how much of an intellectual adventure is to be experienced when the teacher becomes a mere ventriloquist for the author of the text? About the only thing less stimulating is the professor who has written his own text and "teaches" it alone. One such experience stands out in my memory. If we read the text there was no point in going to class. If we went to class there was no point in reading the text. But he took roll, so we went but did not read. I think a course with only a text is about as barren as a desert acre. But this statement does not condemn all text-book teaching. A text may serve as a take-off place for either lectures or discussions not bound to the text. In this manner a text may provide continuity and order, and perhaps logical places of beginning and end that fit a semester pattern. At the same time textbooks have inherent dangers. They become quickly dated in dynamic disciplines, and they tend to substitute the mind of the author for the mind of the instructor on the scene. Basically I consider that not to be good—although the answer rests both upon the relative caliber of the two men and upon how the text is used. While the course with only a text may provide limited intellectual fare, the course without collateral and parallel reading misses much also. Many minds have been concerned with almost any topic. A wealth of material exists in journals and even in uncollected papers, and forms a significant part of the literature on any subject. Such literature contains a diversity of view—if that is what we want—that seldom is to be found in

textual presentations. I wonder if we can expect to develop critical scholarship and self-reasoned views among students if we neglect to lead them to these pastures?

Having made my point for broader familiarity with a wider range of thought than characteristically we have required of students, I must add a note of distrust for what commonly is called "objective teaching." To speak against objectivity no doubt sounds as reprehensible as to speak in favor of sin. This, however, is merely a matter of semantics. What I am speaking for is a dynamic quality in instruction that relates subject matter to our times and its problems, and to problem-solving. "Objective teaching" as I understand the term to be most commonly used, is that which takes the detached view, which does not require students to face issues because the instructor does not face them, which presents both sides or all sides of anything controversial with poise and presumably hands-off judiciousness.

Purely objective teaching in this sense probably is not possible. And I feel strongly it is not desirable. It is stultifying to the mind and leads to nowhere. Of course, I realize that those who favor this technique say it produces objective citizens who can view issues dispassionately. But I am in another camp who believe it produces spectators rather than participants in the issues of our times. Students who are not led to face issues become adults who do not face issues. I think the tragedy of this sort of objectivity is that it produces persons who should be leaders, but without sets of values near and dear and in terms of which they can lead. Then major issues of society in their time fail of solution because those who might have been leaders have become dilettantes and spectators.

It does not matter what stand a student takes after he has thought through a question with logic and strict discipline. Of course, this statement assumes an instructor who is not merely indoctrinating and who has the personal intellectual tolerance to accept from the student any view that is carefully and honestly developed. Likewise it assumes an instructor who will not accept mere intellectual sloppiness.

This is a point of strength and deep meaning in my thinking and my attitude toward teaching. It is, because I believe that if we were to start out to develop a generation of ineffective intellectuals we could hardly do better than to insist upon purely neutral instruction. I deplore the characteristic absence of a clear and positive philosophy of society as the very foundation from which teaching in the social sciences should proceed.

Teach in Relation to Philosophy of Society

This is the essence of my third observation—the social sciences can not be taught effectively in isolation from a philosophy of what human society ought to be. Many are guilty of spending a great deal of time,

in classes and out, discussing in minute detail the form and structure of our economic institutions without having taken students into any exploration of *why* the institutions are what they are. We assume the student, especially the beginning student, has understanding which characteristically he does not have.

Human institutions do not exist independently of a purpose—a conscious and current purpose—unless they should be institutions which are mere anachronisms. The purpose of economic institutions—likewise of all institutional arrangements within the purview of the social sciences—is obviously to foster prevailing concepts of what human society ought to be like. How, then, can it be otherwise than that the philosophy of human society is the point of departure for all teaching relating either to economic institutions or to economic principles in terms of which institutional arrangements are to function? More deeply, is this not the thread of continuity that binds together the whole array of the social sciences?

To try to teach economics in isolation from a philosophy of society is to try to teach in a vacuum. Its principles become an agglomerate of dry bones and its institutions a nightmare of caprice. Why should students be interested in this muddle, and why should they not regard economists as the court jesters of our time? When the flesh of pertinency is left off the dry skeleton of our subject matter we will entice few students to listen to its clatter. Of course, each of us will argue that we do teach pertinent matters, but the attitude of the rank and file of college students toward economics courses argues rather loudly that they do not fully share our views. No such sad circumstance is necessary when the very breath of life and currency can be infused into any aspect of our subject.

I recognize that in practice most of us do teach from an assumed philosophy either of what society should be or what it is. The difficulty is that we assume our students have the same foundation and are prepared to take off with us from wherever we choose to begin. That is a dangerous and usually false presumption. Somewhere along the line, and preferably in a beginning course, college undergraduates need a sympathetic and thought-provoking review of what human society is and how man's aspirations have shaped it into the patterns in which they will live and participate.

I would submit that there is, at any time, a prevailing philosophy of society of which each student, each individual, shares a part. It is a fabric of controlling ideas and concepts that has come down to us from all the accumulated human experience of the past. This fabric differs between cultural groups and between individuals—and it changes over time. Sometimes the changes are significant in a very short time span. From the fabric we drop threads of the past as they seem no longer to be useful, and new threads are added as new concepts acquire acceptance.

In a society such as this in which we are privileged to live, the prevailing national philosophy is the algebraic sum of the millions of individual philosophies. As the individual components change the aggregate fabric changes. In turn, all the institutions—religious, social, economic, and political—by which we live are changed.

An economist in our society has no more right to determine or interpret national philosophy, and corresponding social and economic policy, than has any other individual. As a technician he may properly participate in establishing institutional arrangements fitted to carrying out prevailing policy based upon prevailing philosophy. As a trained thought leader he has the right, and I would say the responsibility to debate the philosophical concepts that underlie any set of institutional arrangements. But I consider it futile to debate the detailed structure of institutions except as related to the philosophy from which they spring.

In the social sciences, once we get outside the functions of the individual farm or business unit, the fundamental problems of our time are philosophic in nature. Where these circumstances touch upon our teaching we have the opportunity, and again I think the responsibility, both to broaden and deepen the understanding of every student we are privileged to contact. The issues are ones with which the student will live. He can hardly remain disinterested. We can lead him through the divergence of thought—and I repeat my belief that we can not afford in the process to appear as neutrals.

Again we must note that teachers are individuals and their methods must be individual. I began this discussion by saying I am expressing only personal views. One of these views is that dogmatic presentations are no more successful than is neutral teaching. And I doubt that an uncertain teacher stimulates much thought.

No student has to accept any philosophy or any interpretation handed to him. But he can hardly participate in a vigorous and well-reasoned presentation of the issues of the day, set against a philosophy that gives the issues currency and meaning, and not come to conclusions of his own. This is a setting in which I strongly believe we can teach economic fundamentals so that they remain useful to the student forever after. Stimulating, problem isolating, problem solving experiences of this kind can change a great deal of adverse student reaction toward the whole field of economics.

What after all are we striving for? Mere knowledge to be parroted on a quiz? Or deeper and more fundamental understanding of our time and our society? Of course. I believe the latter—and after understanding, motivation. What better product can we hope to release at the end of any semester than a stimulated student?

SOME GUIDEPOSTS IN TEACHING ECONOMICS TO BEGINNERS

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WHEN the speaker proposed this topic as his contribution to today's program he was unaware of the fact that such a title implies that he has been around for a considerable time and that he has gained, from experience, some knowledge in this area which may help to guide others. The first part of this assumption—time spent in attempting to teach economics to beginners—is a fact which can be verified from the record, but each person here must decide for himself concerning the guideposts set up here and their value.

Three major problem areas facing teachers and administrators of introductory courses in economics for agriculture will be discussed here. They are: 1. The starting point, or in what kind of course should the beginner be enrolled in the study of economics; 2. The contents of the first course, and 3. Teachers and teaching methods. A preliminary summary of the results of a questionnaire sent this summer to almost all of the departments of agricultural economics in the U.S. covering this general area will enable the writer to pass along the opinions of leading educators on some of these questions.

The Starting Point

Where should the beginner start? The student may start his training in the principles of economics in an economics department outside the college of agriculture.[1] Where there is no general economics department, the first course is usually taught by the agricultural economics department. Such a course may concern itself largely with principles, or it may be one in agricultural economics with a liberal application of economic principles in the field of agriculture.[2] A third method used is to start the beginner in what has been referred to as an orientation course. Dr. Black[3] pointed to the fact that there were at that time two colleges of agriculture requiring their students to take an orientation course as a starter. Ohio State University has had such a course since 1947. This orientation course will be referred to a little later, since there would appear to be considerable interest in this approach.

[1] Slightly over two-thirds of those responding to the questionnaire referred to reported that the first course in principles of economics was taught outside the departments of agricultural economics.

[2] The survey indicates that in almost every school where the beginning course in economics is taught in the department of agricultural economics the principles are applied very largely to the agricultural field.

[3] *This Journal*, Vol. XXXIV, No. 3, August, 1952.

It seems quite logical to start the student in a general course, as is done generally in the area of the applied sciences. The engineer must have his basic mathematics; the animal scientist must have genetics; the horticulturalist must be grounded in botany, and the agricultural chemist must first take the course in general chemistry.

There are some objections, however, to having a course in general economics taught outside the college of agriculture. One is that in many agricultural colleges today the curriculum is so crowded that the student has little or no time left for an applied course in the department of agricultural economics after he has finished his required work in other departments.

Another objection frequently heard from students is that general economics, when taught as such, is too theoretical and abstract for them to understand. This is quite a natural criticism for students who have been, for the most part, in the physical sciences. Another comment about courses given as general economics or principles is frequently that they are taught by graduate students who do not have the background necessary to apply the principles to the agricultural field. This is a criticism which always strikes home, for the speaker still has a very vivid recollection of those instructor days when the student really had to burn the midnight oil if he learned more about economics than did his instructor.

Many departments of agricultural economics have apparently been doing a very acceptable job of combining the principles with a first course in agricultural economics. Where well-trained staff members are available and the course can carry a sufficient number of credit hours to permit the teacher to apply the more important body of economic doctrine to the field of agriculture, this would seem to be a very satisfactory introductory course for agricultural students.[4] Certainly one advantage of this procedure is that students are introduced to the offerings of the department of agricultural economics before they decide on their major course of study.

Another approach is through an orientation course taught by staff members of the department of agricultural economics. Since this approach has been used at Ohio State for the last seven years and since your speaker was the person selected to introduce and develop this course—economic trends in agriculture—it may reasonably be assumed that others may be interested in some of the reasons for its development and something about its success.[5]

[4] From the response to our questionnaire it would appear that the majority of teachers and administrators would prefer to offer their own beginning course in economics.

[5] Apparently there has been a considerable expansion in the number of orientation courses since Dr. Black made his report in 1952. So far, our recent survey indicates

Prior to 1947 all of our regular four-year agricultural students were required to complete 10-quarter-credit hours in the department of general economics, and with this as a prerequisite, follow up with another 5-credit course in agricultural economics. There were two principal reasons this sequence was reversed. The primary reason for placing students in the course on economic trends in agriculture first was to acquaint them with some of the more important economic facts and developments in their own field and thus enable them to do a better job of applying the general principles of economics to agriculture. A second reason for requiring the orientation course first was to permit the student to become acquainted with the field of agricultural economics earlier in his course work so that he might decide on a major in this area, if he found it to his liking, before going too far in some other subject.[6] As with any new course, it required time to get organized and underway, but it has now been given long enough that it appears our two main objectives are being accomplished in large measure.

To summarize guidepost number one, then, would be something like this: Start the beginner in the course which will best cover the basic economic principles and arouse and sustain his interest in economics. This starting point can be general economics, the principles of economics applied to agriculture—agricultural economics—or a good orientation course which will loosen up the ground for the beginner. The beginning course can make or break a department of agricultural economics. Constant vigilance must be maintained over these beginning courses. Comments from those in the field on this phase of our questionnaire would indicate very lively interest in this topic.

Contents of the First Course

The second guidepost in successfully launching students in the field is to select the proper subject matter to be covered and present it in an interesting manner. There would appear to be two major considerations involved in selecting subject matter to be covered in beginning economics. The first should be to cover that body of our economic doctrine which seems essential to a fair degree of understanding of our economic system, particularly as it applies to agriculture. This certainly does not call for a complete study of all economic doctrine. Whether the subject is taught as a course in principles or principles applied to our field, the ground covered should be essential to an understanding of the major

that almost one-third of those colleges in which the course in principles of economics is taught outside the college of agriculture require their students to take an orientation course in the department of agricultural economics.

[6] Comments from those responding to our questionnaire would indicate that many favor a system requiring no major for undergraduates.

group of economic problems facing agricultural people; these were summarized in Dr. Black's article. In addition to a study of the principles that are fundamental to a proper understanding of production, consumption, marketing and prices, income and its distribution, international economics and other significant areas listed by Dr. Black in his article, the writer would like to add one other area; or possibly a background point of view, which should cut across the entire beginning course, emphasized more in some areas than in others. The reference here is to the individual versus the public welfare approach; government controls versus free enterprise, and the essential economic features of a democratic free-enterprise system. Events in recent years have vastly increased the need for a clear understanding of the fundamentals of our American economic system.

In addition to the objectives of selecting the subject matter which will best serve the student and society, another very important consideration is student interest. As teachers and administrators we may map out the subject matter to be covered, but unless we can stimulate and maintain student interest we are likely to find ourselves with a shop and no customers. Experience with the orientation course would indicate that it is the point of departure that determines very largely the students' interest. At first the students in economic trends at Ohio State were required to read some of the early European, American, and Ohio economic history of agriculture, but it was soon found that this was beginning at the wrong end. Much more interest has been obtained by starting the student where he is today and subsequently leading him back by focusing attention on how we have arrived at where we are today. The same has been the case with interest in such subjects as world production and international trade. The student is much more interested in knowing in what part of the world cotton and wheat are produced after he has become aware of the importance of these products in our production and export trade.

One of the advantages of starting beginners in a course in economic trends in agriculture is that the student can see where we are now, where we were in the past, and then do some thinking about where we are likely to go from here. Another advantage in having such a course precede the study of principles is that the use of such terms as "entrepreneur," "economic rent," "subjective value," "oligopoly," "complementary imports," "multiple correlation," and the like can be kept to a minimum. This is not intended as a criticism of the use of such short-cut, summarizing terms; they have a definite place in the economist's workshop, but why worry the beginner with the sixty-four dollar tools before he is ready to use them?

The writer has probably committed an unpardonable sin in the eyes

of the old masters by including a goodly number of cartoons in a manuscript on economic trends in agriculture which is with the printer. But this is not an apology. After thirty years of experience in trying to get students and farm people to take a more active interest in economics, it is the writer's conviction that our greatest weakness as economists is in getting our subject across.

A lesson learned in the agricultural extension service is that farm people are intensely interested in economics when it is presented in an interesting straight-forward manner. The same is true of beginning students. There is, of course, always the danger of over-simplification in teaching economics to beginners. There are two or three ways in which most of us can improve the presentation of our subject to these beginners. For one, we can express ourselves in clear, commonly understood language. In this connection it would seem to the writer that we should encourage our prospective teachers to ground themselves well in such courses as English composition, logic, and argumentation and debate. A group of useful devices for getting our facts or ideas across are visual aids: charts, maps, lantern slides and movies. "Productivity the Key to Plenty" and "Round Trip," both Twentieth Century Fund film strips, have been found to be very helpful in stimulating class discussion in the areas of production and foreign trade. But the most important guide of all is to tie our principles up with economic problems the student can see and understand. We are certain to oversimplify occasionally in our efforts to make ourselves understood, but let us remember, on the other hand, that unless our students can grasp our teaching we cannot expect the fullest participation and interest in our subject.

A forward-looking point of view is also vital to the interest of students in economics. The depression of the thirties and the willingness to attempt to improve our economic status since, through the use of our Federal Government, has stimulated much more interest in our subject. Prior to the thirties much of the writing on economic subjects was aimed at the past, what had happened and why, with at least the implication that it would happen again under similar circumstances. Today we assume the role of economic engineers; if we do not like what we see, we set about to devise ways and means of bringing about desired changes in our economy. This forward look has done more to stimulate the interest of agricultural students and farm people than any other single event in the last decade. Subjects of top level interest to our beginners in agricultural economics are price supports, acreage allotments and marketing quotas, forward pricing, social security, policy questions and Government sponsored credit for the farmer.

As to subject matter for beginners in agricultural economics, then, it would appear to the writer that it should be selected with two objectives

in mind: first, to give the student the economic background necessary to understand properly and to analyze the major economic issues facing farm people, and, second, to stimulate and maintain student interest.

Teachers and Teaching Methods

Last in this paper, but certainly first in importance in the successful teaching of economics, is the teacher. The person who teaches the beginner his economics has a key position. Whether a student thinks well of our subject or not depends very largely on his beginning teacher.

Qualifications are more important for beginning teachers in economics, if not in all of the social sciences, than in physical sciences generally. More training and background are required in this area because the subject matter must be conveyed largely by means of accurate word pictures, but more particularly because most economic facts and theory are interrelated. When, for example, a student asks a question about the price of hogs, the teacher must know more than the law of supply and demand in order to follow through and make the best use of this student's interest. Many facts and a great amount of economic theory are very frequently necessary for a teacher to handle successfully the question of why the price of hogs or beef cattle rose or fell. Demand may involve domestic and foreign purchases, government purchases, consumer incomes, price supports, demand elasticity, shifts in demand, hog marketings, hog cycles, the hog-corn ratio, feed supplies and the elasticity of farm production. In the physical sciences much information comes to the student expressed in formulae, and the student can take one step at a time, feeling that he has more or less completed one segment of the study before he moves to the next. The learning process is different in economics. Much of our subject matter is so interrelated that the student learns more and more about his first lesson in economics as he moves on to new chapters and new subjects, as long as he remains a student of the subject.

To secure well-trained, experienced teachers for all of our beginners would, however, require a larger salary budget than is available to most departments for this purpose; therefore we shall most probably continue with about the staff we now have. Some departments have teamed up their younger staff members with a more mature person who directs the course and in some cases gives the lectures.[7] The success of this pro-

[7] A preliminary analysis of our survey indicates that where the department of agricultural economics gives the first course, close to 90 percent of the staff teaching the course is made up of more mature teachers. But where the first course is given in the general economics department about half of the teaching is done by graduate students or instructors.

cedure as a training program for inexperienced teachers and in improving the teaching will depend very largely upon the person who is directing the course. If such a procedure is followed merely as an inexpensive method of getting the course taught, it is doomed to fail. Those who conduct the discussion sessions should have a part in planning the material to be covered, problems to be worked out, visual aids to be used, readings to be assigned and grading. To be a success such a program must be based on high level cooperation rather than on a superior-inferior relationship. The trainee should be encouraged to study logic, effective speaking, visual aids, and the like, and where adequate supervision is available it occurs to the writer that the student teacher may be given some graduate credit for his work in this area.

There is no substitute for a thorough knowledge of the subject; to do an effective job of teaching economics to beginners the teacher must be full of his subject. This means the teacher should know the principles of economics well enough to apply them. It is the writer's view that many of our students in agricultural economics lack the training in applying economic principles and statistical method to economic problems of agriculture. This can be the result of the student's taking too much of his economic and statistical training in departments outside the agricultural economics department. It may result from a lack of suitable courses in the department designed to give the student training in applying economic theory and statistical method to problems in his own field. In some cases it may be a lack of staff members in the general economics department or in the department of agricultural economics sufficiently trained to offer the needed courses in economic theory, history of economic thought, statistical method and policy, to give the well-trained student what is required. In the writer's opinion it would be a grave error for departments of agricultural economics to equip themselves principally with men trained in such lines as farm finance, land economics, farm accounting, marketing, farm management and rural sociology, depending on their graduate students going elsewhere for their training in such areas as economic theory, statistical method, policy, and research method. Every staff member needs contact with those leaders who cut across the whole field of the social sciences in their thinking in this broad basic area.

For better training in our field we need to encourage more young people to write teaching manuals and textbooks, not merely to increase the supply of books on the market, but to produce better teachers. Most, if not all of us, write research or extension bulletins and articles for farm journals and newspapers, but textbook writing is quite different. To write a text the author must organize his material so that it all fits logically into a completed pattern from start to finish; there is no better

training for teachers. But it is not only encouragement that is needed to get our staff members to write textbooks; it takes time and a tremendous amount of energy. The writer's observation here has been that, generally speaking, those who administer our work in colleges of agriculture are inclined to be too zealous to turn out another research bulletin, write another article for the farm press or take part in another school for farm people which is being held on the campus, to permit the necessary time for writing texts.

DISCUSSION

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Professor Wertz has effectively set the stage for a discussion of the topic assigned to him. He has specifically stated three guideposts or problems in the area of teaching economics to beginners and has discussed each of them.

Guidepost No. 1. "Where should the beginner start?" The major portion of the discussion of this problem is devoted to the nature of the subject matter of the course, although consideration is given to the place or department in which the course might best be offered. Three possibilities are suggested with reference to the nature of the subject matter: (1) a course in economic theory or principles, (2) a course in which economic principles are applied to agriculture, or (3) an orientation course.

Undoubtedly the suggestion that the most logical starting point for beginners is in a general course is acceptable to most of us. The objection to having such a course taught outside the college of agriculture because curricula are crowded is of questionable validity. The statement that curricula are crowded is accepted as a fact. Furthermore, there is a rather strong tendency for agricultural students to defer taking the general economics course until the latest time possible. As agricultural economists we have the responsibility of keeping the way open and encouraging students to take more courses in our field. The suggestion that this can be facilitated by offering the subject matter of a general course in the department of agricultural economics rather than elsewhere evades the basic problem. It would seem that a solution to the problem described would be found in a careful re-examination and revision of the curricula involved.

Two objections to general economics courses are mentioned. They suggest corresponding challenges to agricultural economists as (1) helping students overcome a fear of courses in economic theory or principles and (2) improving the teaching of the beginning courses. Combining the teaching of principles and of their application to agriculture in one course has advantages as well as limitations, as the author recognizes. He assumes that such a course will be given in the department of agricultural economics; the feasibility of offering such a course in a department of economics is not considered. It may be difficult for some college of agriculture administrators to convince higher authorities that economic principles should be taught in the department of agricultural economics rather than, or in addition to, in the college of commerce.

The third suggestion is an orientation course in agricultural economics.

Wertz presents an excellent case for such a course. Presumably the nature of such a course would depend on its specific objectives and its relationships to other courses and would not replace a principles course.

In summarizing the discussion of this first guidepost, the writer leaves the field wide open; you can start at any of the three points suggested. This is undoubtedly a safe and probably a sound summary statement because the practically feasible course of action will depend on situations existing at a particular school. The keys to a successful beginning course are listed as presenting basic economic principles, arousing and sustaining student interest, and maintaining constant vigilance over the course. Individuals looking for one specific recommendation for the best starting point may be disappointed with the discussion of guidepost number one, but it contains many helpful suggestions for those responsible for courses for beginners in economics.

Guidepost No. 2. In the introduction to the paper, this is stated as, "the contents of the first course" but in the discussion it is enlarged to include "... and present it in an interesting manner." In fact, over two-thirds of the discussion is devoted to student interest.

It is suggested that subject matter should cover that body of economic doctrine essential to a fair understanding of our economic system and, if taught as a course in principles, it should develop an understanding of the major groups of economic problems confronting agricultural people. It seems to me that this objective could be defined or interpreted broadly enough to cover recommended economic training for a complete undergraduate curriculum or a graduate program or narrowly enough to represent the subject matter for beginning courses.

The suggested scope for a beginning course(s) includes a tremendous breadth of material to cover and brings up several questions. When does a beginner cease to be a beginner? Is this proposed primarily as a descriptive course(s), as a principles course(s) or as a combination of both? If principles are included, how far can the student be taken in a beginning course(s)? Is the objective to develop a reasonably full understanding of principles and their application to agriculture, or is it to give the student a nodding acquaintanceship with them, the more complete teaching of an understanding of them being left to more specialized and more advanced courses? If such a large area is to be cultivated, how deeply can it be tilled in a beginning course(s)? If courses covering such a breadth of subject matter are required will they contribute to further crowding of curricula?

Numerous suggestions for gaining and maintaining student interest are presented. Wertz need not be apologetic about including cartoons in his textbook. Perhaps the use of them and other visual aids and attention-catching devices is below the dignity of some economists. However, such devices impair the effectiveness of teaching only to the extent to which the instructor is incapable of properly using them.

In the matter of student interest, major emphasis is rightly placed on tying up the principles with economic problems the student can see and understand; another sense, that of feeling, might well have been added. However, this again raises the question as to what should be the breadth and depth of the beginning course(s). It was pointed out earlier that the majority of agricultural students seem to have a fear of courses in principles of economics. Carrying them too far or too deep in the beginning course may not help alleviate this

fear. If effective teaching depends on students actually seeing and understanding problems, perhaps the subject matter for beginners, particularly with respect to depth, should be somewhat restricted. Specialized courses in production economics, marketing, agricultural policy, agricultural credit, and others may provide a setting for more effectively presenting realistic problem situations in which principles can be further studied and applied.

Guidepost No. 3. "Teachers and teaching methods" is the title of the third and final problem discussed. Wertz has outlined a very ambitious program for training men to teach agricultural economics. There is dire need for some such programs. A prior problem, however, might be that of finding men who are primarily interested in teaching. Many individuals maintain that opportunity for recognition and advancement comes more readily to research workers than to teachers; evidently this belief is widespread, because there seem to be relatively few graduate students who are vitally interested in the profession of teaching as such.

In discussing the importance of a teacher having a thorough knowledge of the subject, a suggestion that was made for beginning courses is also mentioned for graduate courses: namely, that more of the courses in economics be offered in the department of agricultural economics. The author suggests that it would be a grave error for departments of agricultural economics to depend on their graduate students going elsewhere for their training in such areas as economic theory, statistical methods, policy and research methods. Several questions pertinent to this suggestion may be raised. Is there danger that such a plan might ultimately result in a narrowing of economic training for our students? Is it financially and administratively feasible? Is it efficient use of resources of an educational institution for each department to offer nearly all the courses for its own graduate students? Would it result in unnecessary duplication of courses and effort? Are the basic economic principles and research methods different for each subject-matter field? Does this idea suggest that economics is no longer the parent discipline and by a series of movements such as this we shall dismember it? Perhaps there are alternative solutions to the problem of providing adequate breadth of training for our students. Is it possible that this is largely an administrative problem in which a solution might be found in greater and more effective cooperation and coordination between colleges, departments, and divisions?

The final suggestion for improving teaching is that more of our young teachers write textbooks and teaching manuals. I have no objection to this suggestion. However, I doubt the feasibility of convincing many graduate students that they should attempt to write books on the basis of personal professional improvement as the only or the major motivation. Writing a good book would possibly accomplish the objective stated—train the teacher to fit his material into a logically completed pattern. However, should not this be one of the objectives of the major portion of our educational work, particularly in assigning term papers, and in supervising the writers of master's theses and doctoral dissertations? If so, it should be an integral part of all student training. If textbook writing is to become more promiscuous, it may prove very disappointing and frustrating to the neophytes.

The emphasis placed on the training of teachers is well deserved. This is a problem which should receive more attention from economists.

IMPROVED TEACHING TECHNIQUES

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TEACHING is a profession; the profession of those who specialize in the learning process. I shall not attempt to discuss the success or failure with which many college professors practice their profession. It suffices to say that college teachers themselves often express the belief that they do not attain a desired degree of success in their classrooms. One might suppose that this realization of the need for improvement arises as a result of too large classes, too heavy teaching loads, inadequate facilities, and ill-prepared or immature college students. Doubtless these do contribute greatly to the ineffectiveness of much college teaching, but in part the failures arise from the short-comings of the teachers themselves. Generally speaking, college teachers are interested in their subjects primarily and only secondarily in how they teach them. Their formal training in teaching methods is either none or, at best, a one-semester course taken as an elective. Yet, if they are to practice their chosen profession with moderate success, they must not only have a thorough understanding of their specialties, but also know a great deal about the inwardness of the student's learning experience. It is the latter in which we are so often deficient.

Method not a Substitute for Subject Matter

I do not wish to infer that a knowledge of teaching methods is a substitute for a knowledge of subject matter. A thorough knowledge of one's subject is the intellectual soil within which roots of teaching techniques are anchored and fed. Thus, the first and most important requirement of a good teacher of economics is that he be a good economist. Effective teaching requires an ease of handling the subject matter in the classroom, and this ease is usually absent unless the teacher has mastered his subject. This means that a teacher must be something more than a problem solver or a reservoir of factual information. He must be able to think logically and clearly, to evaluate, to discriminate, and to exercise originality, resourcefulness and good judgment. Only a knowledge beyond that of the textbook which he teaches will provide him with these desirable traits.

Student's Interest and Development

If you will permit me, I should like to discuss several points which I believe are of the greatest importance to improvement of college teaching. While they may not deal specifically with techniques, they do provide the framework within which techniques are employed.

First, we too often make the false assumption that the student knows why he takes a course, what its broad scope and purposes are, what bearing the subject has on other subjects, and what possible application there may be of any principles taught. Learning is learning to use. Whenever a student has only a vague knowledge of why a course is required in his curriculum, it simply becomes another "dry" course in which he memorizes sufficient factual material and statement of principles to receive a passing grade. On the other hand, if the teacher explains the scope and purposes of the course, its relation to other subjects, and its practical application, more often than not, the student's attitude and study habits completely change. Thus a better atmosphere is created within which independence, initiative, responsibility, and the power to think and enjoy can develop. I believe you will agree that these are distinctive traits which instructors seek to develop in the students enrolled in their classes.

My second point is that we not only teach subjects but also teach students; boys and girls who are growing into adults. A most disturbing problem on college campuses today is the large number of students who fail to complete the required work for a degree, not because they lack the ability but because their interest wanes sometime between the freshman and senior years. Equally disturbing is the large number of students who, although they graduate, look upon some of the courses they study as barriers to getting their degree which, when once passed, can be forgotten forever. This lack of interest is a result of our teaching more often than I like to admit. Do not most of us focus our solicitude on the top one-third of our classes? Is it not just as important that the average student develop fully his "C" capacity as for the exceptional student to develop his "A" capacity? I am not suggesting a lowering of course standards. Each course we teach composes a group of principles in which we assist the students to attain as high a proficiency as possible. But students' accomplishments depend greatly on their interest, thus the best instructors not only teach their subjects well, but also have the faculty of vitally stimulating the imagination and enthusiasm of all their students and challenging them to develop their capacities to the fullest. In some way they reach into their students' lives, changing their interests, their attitudes, purposes and goals, their understanding of life's problems, and their habits, abilities and skills.

My third point is that the effectiveness of college teaching can be greatly increased if the instructor will give attention to the deficiency of his students in the "Three R's." Who among us has not graded a test paper where the grammar and spelling were something less than what we might rightfully expect from a college student? Or, how often have problems revealed a lack of understanding of so simple a calculation as the

percentage? Last year I read a most exceptional article in an educational journal in which the author argued that it is no more right to expect all girls to spell than to expect all of them to be able to bake a cherry pie. This is a queer philosophy of education, and one with which I disagree. The ability to write and speak one's language correctly and to make basic calculations are fundamental to every one. Certainly it is not the responsibility of college teachers to spend their precious class time in teaching these subjects. But if college teachers will consciously study the possibilities of incorporating them as a by-product wherever possible, they can contribute much to the development of their students. It will also increase the effectiveness of their own teaching, for a thorough understanding of any subject depends greatly on the ability to read and express clearly one's knowledge of the subject.

The Course Outline and Lesson Plan

I shall assume that most of our college teaching employs the informal lecture method, with the exception of laboratory classes. The first step in the use of this method is the preparation of a course outline as a guide to the conduct of the course. The course outline serves the same purposes for the teacher as the project outline does for the research worker. Its contents should include the main topics to be studied arranged in order of coverage with an appropriate amount of time allotted to each. Some instructors prefer to list the main topics as simple headings while others prefer a tersely worded paragraph. Under each main topic appropriate sub-topics are listed in order of importance to permit omission of a part if necessary. Assigned readings, both those in a text selected for the course and those on the reference shelf, are listed by either main or sub-topics. Where the course consists of both lecture and laboratory classes, laboratory experiments or exercises are selected and placed in the proper sequence to be coordinated with the lectures.

After the course outline has been prepared, one or more lesson plans should be prepared for each main topic in the course outline. The purpose of lesson plans is to provide the instructor with a clear conception of what he wishes to accomplish during each class period. Depending on the likes and dislikes of the instructor, it may be in the form of either detail lecture notes or as a brief outline. In any event, it should include a development of the principle under consideration in the lesson, a listing of interest stimulators which the instructor can use to keep the close attention of the students, and illustrations of the application of the principle. As a teaching aid, the lesson plan should provide the instructor with a logical sequence for presentation of the course materials. Also, it serves as a check against spending too much time on one or two points with the result that other points are omitted and a basis for getting the

discussion back on the subject if interruptions occur during the class period.

Instructional Aids

During the time the course outline and lesson plans are in preparation, the instructor should constantly keep in mind the need for developing suitable instructional aids for each part of his course. The teacher needs a well-stocked kit of "teaching tools" to help him make a clearer and more forceful presentation of his subject. Learning results from sense reactions which register impressions on the mind. In teaching, sight and sound are the most efficient and useful of the five senses. We can greatly increase the effectiveness of our teaching by employing instructional aids which permit the creation of multiple impressions such as simultaneous use of sight and sound. It is not possible to discuss all such aids, but I should like to comment briefly on the course syllabus, instruction sheets, the blackboard, charts, models, and the various means of projecting materials on screens.

Essential to effective teaching is a course syllabus for use by the students. The syllabus should provide, as a minimum, a listing of the main and sub-topics in the order which they will be studied in the class, the text and problem assignments, the time tests will be given, any required or suggested collateral reading, the approximate number of class periods planned for each topic, and such personal data as the instructor's name, office location, hours available for conferences, etc. I have found it is not practical to assign dates to each topic; too many things happen on college campuses to throw you off schedule. Rather, a more practical approach is to number the main topics, and at the class hour previous to beginning the next topic make the announcement that assignment two, five or eight will be started at the next class period. The syllabus helps in many ways. It avoids many errors in making assignments, it helps the student to see in outline form the content of the whole course and the relation of each part to all others, and it provides the student with a single assignment sheet rather than having his assignments distributed at various points throughout his note book.

By instruction sheets I refer to the use of the various processes of duplicating materials for distribution to students. Processed materials may be used in many ways, the most important of which are: (1) To provide material supplementary to the text, (2) computation forms for recording data and working problems, including instructions therefor, (3) instructions in use and care of equipment, (4) complicated diagrams, extensive statistical data, etc. which are discussed in class, (5) notes on purposes of and procedure for field trips, and (6) detail outlines of specific sections of the course which require considerable note taking on the part of the student. One of the main advantages of instruction sheets is

that they permit the student to give his undivided attention to the lecture and discussion while spending a minimum of time copying graphs, diagrams, and statistical materials from the blackboard. There is a tendency for college students to spend too much time in taking notes. I have found instruction sheets one means of correcting this practice.

The blackboard is the most indispensable of all instructional aids. When used properly along with the lecture and discussion, it permits the instructor to illustrate his points to great advantage. It is especially well adapted to explanations of diagrams, charts, etc., the working of problems, and providing an outline for the student to use in taking notes on the lecture and discussion. Its greatest advantage is that you can construct an idea step by step as you explain it in detail. Successful use of the blackboard results from planning its use when the lesson plan is prepared. The instructor should know ahead of the class hour what parts of the lesson can be best illustrated on the blackboard and determine the manner of construction of the work. There are a few "don'ts." Don't write on the blackboard and talk at the same time. Don't hide the blackboard with your body. Don't scribble; write legibly and orderly.

Charts are excellent instructional aids if the class is small enough to permit all students to see them when produced in reasonable size. When used, they should be well made and simple enough to permit ease of understanding. Simplicity can sometimes be gained by producing a complicated chart as several charts. It is usually desirable to furnish the students a mimeographed copy of the chart to avoid the necessity of copying it during the explanation.

Models, like charts, can be used successfully only if the class is small. If used, the model should be made to scale. The construction of models is usually time consuming and, in some cases, the expense involved is prohibitive. Models often have the advantage over charts and diagrams, however, in that they may be constructed with movable parts to provide an actual working demonstration. Whenever models are used care should be taken to make sure the students do not lose sight of the principle involved.

Filmstrips, lantern slides, and opaque projections are more modern instructional aids. Primarily they contribute a different way of appealing to the student's sight sense, rather than furnish an entirely new approach. In fact, their greatest use is an improved means of showing charts, diagrams, maps, etc. All three require a projector and a darkened room. In some respects they are less troublesome to use than actual charts, etc. For example, it may be much simpler to make a lantern slide from a small chart in a book, periodical, or other printed material than to actually reproduce the chart in sufficient size to permit the students in the back of the room to see. On the other hand, the instructor must be

able to operate the equipment and the projector must be available for use in the classroom. The chief handicaps are the darkened room, and the necessity for the instructor to be away from the screen to operate the projector unless he has assistance from his associates. Each type of equipment has special features which make it more successful for certain usages. For example, the lantern slide is more flexible in that the sequence may be changed when necessary and new materials may be inserted easily. Filmstrips have the advantage of purchasing materials to parallel text materials, and the projectors are usually more portable. Opaque projection is especially good for courses which change so rapidly that text books are not adequate or for situations where the textbook must be supplemented by considerable reference material.

Summary

In brief summary, college teaching can be improved through better organization of the courses and the use of instructural aids which help the student to learn through both his senses of sight and sound. To accomplish improved teaching through these two means, instructors and administrators of colleges must recognize the need for allowing instructors considerable time free from other duties to organize their courses and revise them when the need arises. Too often the assumption is made that because the instructor has a M.S. or Ph.D. degree, he is ready to take over teaching any subject in his field without advanced preparation except perhaps a slight amount of review wedged between other duties. Teaching is the organization of learning. Thus, any instructor, regardless of his knowledge of subject matter, must spend considerable time organizing his courses before effective teaching is attained in his classes. He must also have sufficient time and competent personnel to develop adequate instructional aids for use in his courses.

DISCUSSION

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Professor Gibson has elected a double-barreled approach in his analysis of teaching methods. The first barrel deals with specific points which he believes are of greatest importance in the improvement of college teaching. These points are:

(1) The student must be told the place and purpose which a specific course fills in his curriculum.
(2) The student's interest must be kindled and held.
(3) The student's proficiency in reading, writing and arithmetic must be developed.

The second barrel deals with the course itself and the ways of conducting the class. Professor Gibson stresses the course outline, the lesson plan, and

instruction aids. He considers the blackboard "the most indispensable of all instructional aids." Other teaching aids include instruction sheets, charts, models, filmstrips and the like. In short, what is recommended is improved organization of courses and the full use of devices for the student to see or hear.

Professor Gibson recognizes such teaching handicaps as "too large classes, too heavy teaching loads, inadequate facilities and ill-prepared or immature college students." These difficulties are less responsible for poor teaching, he feels, than the fact that "generally speaking, college teachers are interested in their subjects primarily and only secondarily in how they teach them."

A brief look at the modern teaching environment might improve our perspective on the teaching of economics. Teaching has improved a great deal at the grade and high school level. Textbooks are much better than we had in our one room schools of the twenties and the teachers are better trained. School terms are almost uniformly nine months long and attendance is enforced. The students are better read and have a better understanding of matters of national and international importance than was true even ten years ago. Movies, television, newsreels, magazines and war have all helped to give these youngsters a broad perspective.

The teaching tools have improved in like manner. Professor Gibson has mentioned a number of teaching devices and techniques that were unheard of a few years ago. Textbooks are somewhat improved and a wealth of supplementary material is available in bulletins and other publications. Money is usually available for the purchase of needed teaching aids. Most of us are in the position of the well-publicized farmer who wanted no educational material from his county agent because he already knew how to farm a lot better than he was farming. Most of us know how to teach a lot better than we are teaching.

What prevents us from being outstanding teachers? Some of us should be in other professions. There was a tendency during the depression for college students to continue in school for lack of an alternative. Some of us qualified as economists during that period and have never had enough initiative to start over in any other profession. Graduate study at the higher levels certainly does not tend to select those persons best qualified to teach. The best potential teachers are probably employed in administrative or even sales activities.

Not all of the required teaching aids are readily available. My personal teaching problems include the lack of usable textbooks in research method and livestock marketing. Other handy aids for me would include a current listing of visual aid materials by subject matter and source. A guide book on the preparation of stimulating and educational examination questions would be extremely useful. My greatest need is for time—time to read new materials, to plan lectures, to write professional articles, and to discuss subject matter with colleagues and students.

It seems possible that the best way to improve teaching may be through a program of student ratings of individual teachers, counseling and testing service for teachers and finally ruthless pruning of incompetent staff members. Unfortunately the average college administrator does not have the training or authority to carry out such a program. The alternative is for each teacher to assume a continuing responsibility for self-improvement. This involves full attention to all of the teaching methods outlined by Professor Gibson and others who have considered this subject.

IMPROVING AGRICULTURAL ECONOMICS EXTENSION

Chairman: H. C. M. Case, University of Illinois

IMPROVING AGRICULTURAL ECONOMICS EXTENSION IN THE DECADE AHEAD

C. B. Ratchford
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THERE is little doubt that Extension Agricultural Economists have a remarkable opportunity to improve the quality and quantity of their contribution to society in the decade ahead. Developments within the science of economics, improved communication techniques and facilities, and larger quantities of more useful and accurate research are the major factors which will help the Extension economist improve the quality of his contribution. The economic situation, and political, institutional, and technological developments will give the economist an opportunity and perhaps a mandate to increase the quantity of his contribution.

Certainly economists are happy that they have an opportunity to increase their contribution to society. Economists above all other groups should realize that for every benefit, a cost is attached. The cost in this case is the responsibility to actually make the contribution that is needed. A failure to deliver could ruin the individual and seriously "set back" the profession. We will return to this point; but first let us examine more closely the conditions which are responsible for the economist having a greater opportunity for service.

Greater Opportunities

The Extension Services have received additional funds this year; and if it can be demonstrated that Extension can accomplish the objectives of the expanded program, additional funds will be forthcoming. The additional funds are to be used to begin to reorientate the Extension program. Extension received additional funds to expand and reorientate its program for several fundamental reasons. First, it was obvious that some of the more direct methods used during the last 20 years had not solved pressing problems of individual farmers and the Nation. Research and education will now be given an opportunity to begin to solve these problems. Second, the Extension Service had devoted most of its efforts to selling particular pieces of technology. The technology was not always related to problems and opportunities of individual farmers. The technology was usually not interpreted in economic terms which is the

important consideration to the farmer. The aggregative effects, marketing problems and policy aspects were generally ignored. Extension now has a mandate to integrate its information around individual farmer's problems and opportunities, to interpret this information in economic terms and to appraise its consequences. Extension also has a mandate to help solve marketing problems all the way from the farmer to the consumer. Public policy work must also be expanded.

The expanded and redirected Extension program was not conceived just to give the economist a greater opportunity. There are a number of increasingly powerful forces indicating the need for economic analysis.

General Economic Situation

The general economic situation facing farmers is the most dramatic, although perhaps not the most important, factor indicating the need for the application of sound economic principles throughout the economy. Some of the major features of the present situation which are of particular interest are large surpluses, falling product prices (and net incomes), a cost structure which is proving difficult to lower, sticky marketing costs, and government intervention in economic processes.

In a situation of this type there is an increased need for farmers, marketing firms, consumers, and Governmental bodies and agencies to know and use economic principles and information. Farmers and business firms might have done better during the last 12 years if they had applied economic principles and information to their businesses; but careful study and planning was not necessary for a profit to be earned—indeed, in spite of poor planning profits, were often higher than ever before. In this type of situation it was natural for managers to place primary emphasis on technical rather than on economic matters. When there are no alternatives, there is no place for an economist. Certainly there were alternatives facing each firm during the last decade. Evaluation of the alternatives did not seem too important, however, as each alternative was likely to help the firm attain its goals. Certainly today there is a need for all types of decision making units—private and public—to explore and appraise alternatives. In this sort of setting sound decisions cannot be made without the application of economic principles and information.

The general economic situation is not the only factor responsible for increased emphasis on economic analysis. There are several long time trends which, while calling for economic analysis previously, have progressed to the point where decision making units must use economic information. Let us identify some of these trends with the major fields within agricultural economics.

Agricultural Production

One of the most important trends that farmers are living with is the increased use of new technology. New technology is becoming available at an ever increasing rate. In general, adoption of new technology is requiring ever larger quantities of capital. Many people would have you believe that the only information farmers need to decide whether to adopt new technology is to determine whether increased returns exceed increased costs. Also costs are often limited to the direct or operating costs. Such an analysis is usually inadequate, although in every case this is the first step in a more complete analysis. The effect of the incorporation of the technology on the entire farm business must be determined to adequately appraise the technology. To illustrate the point, let us consider the effect of applying fertilizer to corn.

The first step is to determine whether this practice pays on an acre or on the corn crop. We need to go further, however, and determine whether the increased profitableness of corn should result in a larger acreage of corn and if so the acreage of what other crops will be reduced. Does it mean more livestock, changing marketing practices, adding new, more, or different machinery and a whole host of similar questions. Thus, appraising the effect of what appears to be a simple piece of technology actually is quite complicated, requiring the use of a host of economic principles and tools.

One additional point regarding technology should be added. As technology results in operating costs and long term investments being increased, risk is increased. Appraisal of the risk factor can be handled satisfactorily only with the aid of economic information and analytical tools.

A second production trend important to farmers is the increase in size of business. Part of the increase in size has been necessary due to the economy of scale associated primarily with machines and buildings. The economy of scale factor becomes increasingly important as more specialized machines and buildings are developed.

A third trend is the increase in the cash cost of operating farms. This condition has several results. Risk is usually increased. Farmers must either carry large cash balances or borrow large sums of money. The most important consequence to managers, however, is less obvious.

Managers usually have little idea of the price of non-cash factors of production. If they do have a price in mind, it is largely a subjective value and changes slowly. Obviously prices of purchased factors are known. Also factor prices, particularly relative prices, change as quickly and as sharply as product prices. Changing factor prices are just as likely to

result in a change in production plans as changing product prices. Farmers desiring the maximum income must use economic principles and information to obtain the optimum combination of factors.

Marketing

The need for economic analysis is just as great in marketing as in production. Thus new technology in marketing must be interpreted in economic terms to marketing firms just as production technology must be interpreted to farmers. There are other areas, however, where the problems are different.

Undoubtedly the most dramatic trend in marketing has been the addition of marketing services. This in itself has little meaning to the economist. The economist is vitally interested in one of its major consequences. The addition of services and new technology in transportation, processing, and storage has resulted in consumption taking place much farther from the point of production in terms of miles and the number of people or processes between producers and consumers. This has made it increasingly difficult to accurately reflect changes in consumer demand for quantity and quality quickly back to producers and to get producers to respond to the changed demand. Due to the nature of agricultural production, farmers could not adjust supply exactly to demand even if they had the necessary information and adjusted as quickly as possible. Hence, there is a job of acquainting consumers with the production situation and securing a response to it. The economist has a major role to play in securing better communication all along the marketing channel and in securing a response at both ends of the channel to changes in supply and demand.

Another obvious marketing trend has been the performance of less marketing services by the producer. Many producers should perform still fewer services. On the other hand, producers and society would benefit by some producers performing additional marketing services. Determining who should perform the marketing services can be answered only with economic criteria and information.

Perhaps the greatest opportunity for securing changes in marketing which will benefit either producers, consumers, or both lies in the area of changing the marketing structure. While technical considerations are important, economic interpretation is necessary to indicate possible and desirable changes.

Credit

Credit is becoming increasingly important. Not only are farmers using more credit, but their credit needs are more varied than formerly. There

is a need for farmers to examine credit needs and current uses. Lending agencies should review credit practices to see if they are sound, meet the needs of borrowers, and are consistent with present technical and economic conditions.

Tenure

A decreasing number of tenants has not made the tenure problems less important. Indeed tenure problems are becoming more pressing. New technology, increased capital requirements and uneven changes in factor prices are placing many strains and stresses on existing rental arrangements.

Increased capital requirements and land values and increased pressure on limited land resources are making it harder for young people to get started in farming. New technology is also making it more difficult to earn a decent income from a small acreage. These factors indicate the need for paying more attention to inheritance problems, transfer of farms between generations, and family farm operating agreements.

Part-time farming is becoming more important. It is likely to increase in importance as additional areas industrialize. The trend to decentralize industry will give added impetus to part-time farming throughout the country. Generally speaking, the Extension Service has ignored this segment of the rural economy. County agents have paid little attention to part-time farmers because they do not know their goals, do not have information tailored to their needs, and do not know how to reach these people. Certainly the economist can play a major role in developing and conducting a part-time farm program.

Other growing tenure problems, which also fall in the area of public policy, deal with public versus private ownership of land, rural zoning, and conservation of soil and water.

Public Policy

Trends in public policy paramount the need for decision making units at all levels of our society to use sound economic principles and information. As the several groups in our society have learned that governmental action can mitigate what they consider to be evil effects of the free enterprise type of economy, there has been increased pressure from all groups for the several governmental agencies to enter into economic and social processes. To a large extent, the governmental bodies have granted the types of programs which groups have requested. After a period of years in which the trend of increased governmental interference in social and political processes was uninterrupted, many people are beginning to question whether the governmental bodies should have gone as far as

they have. A more important question, or at least a more common one, deals with whether existing programs accomplish their established goals. Obviously many of them only partially accomplish the goals at best.

How will programs be developed which *do* accomplish recognized and agreed upon goals? If we maintain our present form of government, we will get sound programs only when the leaders of the so-called pressure groups, which we hope truly represent the thinking of the majority of the group, are able to appraise the consequences of present and proposed programs in terms of the goals. Also, the best way to insure leaders of groups, actually representing the members, is to have the members of the group have an understanding of the consequences of program proposals.

A continuing educational need is to develop in all segments of our society a working knowledge of the economic, social, and political processes that make our system work.

How the Extension Economist Can Meet the Challenge

We have reviewed a few of the factors pointing up the need for more economic training on the part of decision making units. The economist must do his part, however, if he is to capitalize on the situation. The balance of this paper will be devoted to means of taking advantage of the situation.

Personnel

Research and education depend, probably unfortunately, more heavily on the capabilities, training, and initiative of the individual than many other lines of productive endeavor, particularly those using machines. Realizing the importance of personnel, what sort of personnel make ideal Extension Economists?

All Extension workers must have a good personality and a desire to work with people. In addition, the Extension Economist must be well trained in economics. He needs fully as much training in *theory* as the research worker. A thorough understanding of the science is necessary to interpret research information into "layman" language and to teach farmers and businessmen the necessary economic principles. Of course the ideal Extension Economist would know economics and the technology involved in the particular field of agricultural production and marketing in which he is specializing. Usually this combination is unobtainable, at least with new men. Where a choice must be made between having a knowledge of economics or technology, select the man with a knowledge of economics. This is important not because technology is less important than economics, but because technology is usually more fully understood than the economic aspects.

In many places experience as a county worker receives high priority in employing specialists. Certainly this experience is desirable but it should not be substituted for training in the sciences.

Subject Matter To Be Taught

An economist can make good use of economic tools in selecting data to present to farmers, marketing firms, and consumers. The problem is simply one of allocating scarce resources to achieve certain goals. Hence, we should select those activities which give the greatest returns in terms of the goals for the work.

There is little doubt in my mind that primary emphasis should be placed on teaching principles and the findings of fundamental research. I am sure that this gives higher returns than the other extreme of answering direct questions of decision making units for several reasons. First, principles and basic information will provide an answer not only for immediate questions; but will make it possible for the decision making unit to answer questions which will arise in the future. Second, principles and basic data are more useful than other information in finding answers to problems. If the problem is at all complicated, it is usually impossible to add the evidence that is available and come out with a satisfactory answer. There are almost always gaps in our information and often there is conflicting evidence. In a situation of this kind, an answer with reasonable reliability can be obtained only with the use of a theoretical framework on which empirical evidence can be added. Third, principles and basic economic information help the decision making units determine the relative importance of a problem and the level—individual or collective—at which the problem can be solved. Fourth, the educational objective can best be achieved by teaching principles.

Since Extension does not have a captive audience, the principles cannot be taught in the same manner as they can in a class room. Decision making units are interested in solving problems. Hence, principles should be taught in connection with recognized problems. Also, the Extension Economist should not feel that it is necessary to label a certain piece of information as theory or principle. The important point is for the decision making unit have a working knowledge of the theory.

I would like to make a comment with regard to the type of problems we try to help farmers solve. First, decision making units are often concerned with short range and "felt" problems or the type farmers and county agents write about to the specialist. Often these problems are relatively unimportant. The basic problems may not even be recognized. In this case the Extension Economist may make his maximum contribution by making the decision making units aware of their major problems. I would like to give one example of how Extension Economists in the

South have made the entire economy aware of a basic problem. When I first started with Extension most people, even well educated people, did not recognize small farms as being a problem. This was natural in view of events which had taken place, particularly during the thirties. It was even unpopular to mention that farms should be larger. Yet, through research and careful and persistent educational programs, small farms are now almost universally accepted as a problem. If Economists have made no other contribution during the last decade, they have earned their pay.

The preceding paragraphs, while applicable to all fields of economics, are particularly applicable to farm management. I would like to make additional comments on where major emphasis should be placed in marketing and policy.

There has been a tendency for Extension Economists to concentrate on farm level marketing decisions. Probably greater returns can be secured from working with marketing firms and the market structure. The Extension Economists, who have moved beyond the farm level, have often concentrated on teaching technology. Certainly these units need technology, and perhaps the Extension Economist is the person to teach this technology. In many cases he will not be the man, however, best qualified to teach the technology. Regardless of his qualifications, the Extension Economist should place great stress on helping the marketing firms recognize the important problems and secure a working knowledge of economics.

Consumer education is a growing field of work. Many people have considered selling more products to be the primary objective of this work. This objective is questionable for several reasons. First, due to the extremely inelastic aggregative demand for farm products, it is difficult to increase the consumption of all farm products through a promotional program. Obviously this statement does not apply to one commodity, but increased sales of one farm product are made at the expense of others. Second, I question whether a public agency should attempt to exploit one group of the economy for the benefit of another. Consumers should be supplied information which will help them make more rational discussions. The information needed includes (1) the principles of consumption economics; (2) the current situation on supply and quality of products; (3) the price outlook; (4) technology connected with nutrition and other phases of home economics. Technical information alone, however, is as insufficient for rational consumer decisions as for farmer decisions. Economic information, including principles, can be very successfully taught in connection with technology of nutrition, particularly new developments.

A consumer education program may result in increased consumption

of some items. This is a happy situation if the increased consumption is the result of consumers acting on new information—or at least new to a particular consumer—on prices, technical relationships, or a better understanding and application of economic principles. The same information should be presented even if it results in decreased consumption.

It has been popular in the field of policy to present information in the form of lists of pros and cons. While the objective in this type of presentation is admirable, can the economist be more helpful and still not make decisions for the people? In order to make sound policy decisions, the several units need to know the consequences of alternative courses of action that can be followed. The economist should be able to list the alternatives and by using fact and logic give an objective appraisal of the consequences of the alternatives. This technique gives a marvelous opportunity to teach economic theory and basic data, which will help the people make their own appraisal of future programs.

I want to add one additional comment, which brings us back to the starting point of this particular section. In every case the information that is taught should be useful and helpful in decision making. Data that merely recount past action should be excluded unless they have a bearing on current or future decisions. This places a high premium on theory which has lasting value.

Teaching Methods

One of the major ways for the Extension Economist to be more effective is to improve his teaching methods. Until fairly recently the Extension Economist was usually known as the man who made a long dry speech illustrated by some complicated charts which the audience did not understand. Tremendous improvement has been made and today the Extension Economist is often regarded not only as the most useful man on the staff but also as the most interesting. Part of the change has been due to the economist himself and part to changes in the entire field of Extension methodology. Economic data was never particularly well adapted to result and method demonstrations. With the trend toward meetings, publications, and mass media, the economist has a good and perhaps a better opportunity than scientists in other fields.

The basic objectives of Extension methodology are to communicate and to motivate.

Communication and motivation can be improved by simplifying words and composition and by illustrating with pictures, charts, models, and other means. The number of people contacted can be increased by devoting more attention to publications and the mass media—the press, radio, and television. Television will soon be a standard fixture in most homes.

It is a wonderful teaching medium. Yet, there will be a tendency, at least there has been in our State, for already overworked economists not to take full advantage of the medium. If it is assumed that time is currently allocated to an optimum, returns are often higher from spending a day going many miles to talk to 30 to 50 farmers than in preparing and giving a TV Show which gives an opportunity to visit in thousands of homes. The effectiveness of each method should be appraised and time should be allocated among methods in a manner that gives the greatest returns.

In spite of the preceding statements, I would vigorously deny that individual contacts with county agents and farm and marketing firms should not be made. A personal contact is not only necessary in many cases for communicating with and motivating decision making units; but they are necessary to keep the economist informed on problems, goals, and value systems. Many states have been moving to a middle-of-the road position with respect to methodology. A large share of the total time is being devoted to meetings, telephone calls, letters, and the distribution of publications. I feel that we need to move from this position in what appears to be conflicting directions: On one hand, we should spend more time in making personal contacts. On the other hand, we should devote more attention to the truly extensive media of press, radio, and television. Actually instead of conflicting, these methods complement each other.

Method Of Approach

One of the major ways for the economist to improve his contribution is through being cooperative, positive, and helpful. Economists have probably been more guilty than other scientists in feeling that they always had the correct answer. They have also been liberal in their criticism of the work of other scientists. It is granted that in many cases the criticism has been correct. On the other hand, the economist has been wrong as frequently as the technical scientist.

The economist can make perhaps his major contribution by working with the technical scientists. As indicated previously, technical data is most useful to decision making units when interpreted in economic terms. I feel that the economist will have a chance to work with the technical scientists in the future. Whether they do work together will depend fully as much on the economist as on the technical scientist.

A good rule to follow is to always be positive. Make your criticism positive. After you criticize, take time to work out an acceptable solution. As the Extension Economist gets an expanded opportunity, he will be on the spot. Attitudes and relationships will be just as important as other factors in meeting the challenge.

DEVELOPING A SET OF BASIC PRINCIPLES FOR ECONOMIC EXTENSION

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THERE is a tremendous gap between what is known in economics and the economics known and accepted by the general public. The challenge of the economic educator is to help close this gap. The task of the agricultural extension economist is to put his economic knowledge into terms which make it a living, usable science which guides men's actions. This is a task which taxes the abilities of the most capable.

In carrying out this task, it is pertinent to raise the question: what principles or guide posts have we found important? In a review of the literature, few studies and a very limited number of articles were found dealing with this subject. For this reason much of the material presented in this paper of necessity is based upon experience and observation. In this presentation the principles which I wish to suggest have been divided into two groups: first, those which apply to all areas of extension education, and second, those that apply particularly to agricultural economics extension.

Principles Which Apply to All Areas of Extension

Through the years we have developed certain principles which apply to all extension. I should like briefly to call your attention to certain of these which should likewise be recognized in economic extension.

Start with where the people are with whom you are working. This is an old axiom generally accepted by extension workers but still overlooked by some. We may believe that a certain type of farm organization or certain economic action is more desirable for a farmer to take than another. However, if the farmer does not understand it or will not accept such a large jump at one time, it is effort wasted to make plans for him and suggest decisions beyond his comprehension at the moment. Most of us move a step at a time.

A certain percentage of farm people can attend meetings and demonstrations and then go home and put the new principle into operation on their own farms. There are many more, however, who cannot make this transition and who need individual assistance in applying the new technique or new principle to their farm businesses. This variation in people's abilities necessitates different approaches in extension work, but in each case you must start with where they are.

The development of a progressive extension program involves a two-way street—the felt needs of the people on the one hand and the available

information only known to the specialist on the other. While keeping close to the people's felt needs is important, it is also important to develop devices for letting the people know about new services that are available. They cannot ask for penicillium if they have never heard of it. They are not likely to ask for assistance on the old age and survivorship problem, the farm program, or county zoning if they do not know that the extension service is working in this area and has information to contribute. Therefore, developing devices for informing at least some of the people in each county of the new activities available is also necessary. This may be done by the use of experimental countries, by district meetings with leaders or with county meetings where the extension worker takes the responsibility of arranging for the presentation of these new things. I know the county agent in this county in which we are now located has in the past followed a policy of scheduling one day with his county extension committee at which time they discussed only new extension activities and dreamed about new possibilities. A discussion of already established projects was taboo.

It usually takes more than one approach to bring about a change in the farm family's way of doing things. Therefore, we should pile up the evidence and approach the individual farmer or family from various angles. For instance let's say there are many farms in a given community which studies show should enlarge their hog enterprise. Before an individual family makes a change they may wish to budget their farm through. They may wish to see what records show of farmers who have made the change. They may insist on visiting some farms which have made the change. Budgeting is an effective technique for measuring the effect of changes in farm management. However, we must remember that feed salesmen, machinery salesmen, and inexperienced extension workers are all budgeting with the farm family and the results do not always come out like the budget. Therefore, the farm family wishes to look at several sources of evidence before they make a change. This is well for them that they do.

Principles Which Apply to Economic Extension

Let us turn our thinking to the principles of economic extension. In so doing, let us first remind ourselves that the purpose of all science is prediction. To the extent that economics is a science, it is useful for prediction in the solution of problems. On certain occasions when economics is being discussed one wonders if this fact is fully recognized. In extension it is particularly important that it should be.

Every economic problem has more than one possible solution. If it does not, there is no decision to make. The solution may vary for each individual because of his varying values and resources. This is a principle which

we should recognize at the beginning because it has fundamental implication not only in our extension work but also in our research work. Only by making certain assumptions can a definite answer be given in economics. This principle points out the necessity of teaching the process that one must go through in arriving at answers to economic questions. This principle has been overlooked by many production specialists and some economists.

Physical and managerial resources vary on every farm which in turn makes the marginal value of each resource different on each farm. The fertilization program for a farmer in the 30 or 40 percent federal income tax bracket is much different from what it is for the young farmer who may need the last dollar to buy a dairy cow to produce milk for family use. Hail insurance may be important to the farmer who is short of capital and just getting started but unnecessary for the farmer with sufficient reserve to carry his own risk. The full recognition of this principle limits the blanket recommendations that can be made in the economic extension field. It forces the individual approach. It is important to know the limitations of our economic information.

Each individual has a different set of values. These values vary according to each individual's heredity, environment, training, and experience. Therefore, a perfect knowledge of the same set of economic data may result in different individuals arriving at totally different solutions to a problem. One man may put a high value on current economic income, while another puts greater emphasis on freedom—thus, an honest difference in the positions taken relative to the type of farm program that we should have. No amount of economic analysis could bring these together. Their differences rest on a different scale of values. The foundation of democracy demands that these values be respected by the economist. It is not the job of the economist to substitute his values, no matter how desirable they may seem to him. The recognition of these values is particularly important in public affairs work and should be recognized in marketing and farm management as well.

Economic education requires that individual and group problems be approached by setting forth the problem, the alternative solutions to the problem, the consequences of these alternatives, and where groups are involved provide the opportunity for the group concerned to apply their values and arrive at their judgments. In addition to teaching the process of arriving at the answers to a problem, data must be provided which will allow the individual or group to arrive at an answer. It is not enough to tell a farmer what he ought to think about and how he ought to think about it in determining what proportions of corn and grass he ought to grow. Leaving him at this point leaves him at a point of frustration. He

must be provided with the best economic data available to use in the process so that he can arrive at an answer to a given situation. This is not only true in the case of farm management problems, but also in marketing and policy as well.

With group problems sufficient economic data and analysis must be made so that the group can appraise the different courses of action. It is not enough to point out the principles and the different possible alternatives that they have available. Thus, the economist must be prepared to provide the factual material. In some cases the economist may wish to make certain assumptions and arrive at specific answers for the most typical situations. But whether he does this or not he must have the material so each individual can.

The scientific approach to a public policy issue might logically be to set up the necessary assumptions and then appraise the alternative methods in the light of these assumptions. This is a satisfactory approach in research. In extension, however, it does not work. People may disagree with one of the asumptions made and then do not give consideration to the balance of the analysis because they do not accept some of the assumptions. Experience has indicated that we can deal with the most controversial problems if we take this approach and strive for objectivity even though no one can be completely objective. This involves the necessity of the group involved having the opportunity to participate in the discussion and of expressing their judgment after they weigh the analysis of alternatives in the light of their own values.

We have been inclined in our economic work to provide bits of information rather than to approach our work from the problem basis. For example, take the marketing problem of "where should I market my hogs?" The farmer first wants to know what the situation is, Is there a problem? Next he wants to know the different alternatives open to him. He then wants to know the consequences of these different choices. This involves such questions as the marketing charges at each place, the shrinkage and fill involved in going to different markets, the grading or sorting used at each market, and transportation costs. In other words, to answer his problem a series of economic data is necessary. This is true with most of the farmer's problems if he is going to arrive at an intelligent solution. Research needs to be organized to deal with the problem rather than just one phase of it, unless the balance of the information is already available.

Presentations by various methods may be made by the Extension Economist which do not set forth a problem and its alternative solutions. Nevertheless, the presentation should be related to a particular problem. Let's take, for example, the presentation of outlook. Here we are trying to give the farm family a better set of prices to use for their inputs and

outputs when doing their planning for the next year. Information of this same nature concerning a new program or a new technique of production is often presented. Extension men and women who ask themselves just how this information can be used in solving a particular farm problem are more effective than those who do not. For instance, one may spend considerable time and make an excellent analysis of what will be the price of hogs three months hence. The question, however, that needs to be answered to meet most farmers' problems is what will be the price of hogs ten months hence. The point I wish to make is that in the presentation of all our information needs to be geared to the solution of some of the farm families problems. Merely to enumerate a sound economic principle not related to the solving of a particular problem is about like getting up in the air a mile high and spraying 2-4D in the hopes it will land where it will do some good; some will but most of it will be wasted. The farmer's time is valuable. He is not interested in information for information's sake.

The problem approach should be taken and only economic facts which bear on the particular problem should be presented. Adults who do something about problems are too busy to take time to learn about everything. The competition for the time of farmers, for reading and attending meetings, is great. The presentation of economic facts and trends unrelated to a particular problem should be left to those who have captive audiences.

The economic tools provided for the farmer's use must be simplified so that he will use them. In many cases today the farmer is being provided by suppliers with a bundle of services. He buys protein feeds mixed ready for use. The question is not how he should mix the feed but what is the best brand for the money and how much should he feed. He buys his seed corn ready to plant. He does not need to know how to produce seed corn. His problem is what variety should he plant and where can he get it at the most economical cost. He buys his field sprays and perhaps its application by airplane all in one transaction. If we are to keep up, we must give him a tool which is simple to use so that he will not get bogged down in the details.

For example, if we want to give the farmer a device to measure his volume of business, we now figure .75 man work units per crop acre and 7 man work units for a sow raising two litters and so on for the other farm enterprises. In a very short time by this method the farmer can get a rough check of his volume of business without a great amount of calculation. In earlier periods you will all recall when we used to figure out the man work units for each crop and vary it for the number of times the hay was cut, etc. We now give the farmer one figure which takes care of the whole enterprise. He will stop long enough to do this. After he has used these rough tools he may want to know how the tools are made and may

want to go into more detail. But not until his interest is aroused on the broader basis. This principle applies clear across the board in all of our economic activities. Man work unit is just an example from the farm management field.

Significant problems about which something can be done should be selected. There are many problems in economic extension. There is always a question of selecting the ones for which we are going to use our resources. It is important that we select those for which we can show accomplishment. Interest may be temporarily high in connection with some situations about which nothing can be done or which are relatively unimportant. We should not allow our resources to be drawn off into this type of activity.

The economist must spend a substantial part of his time working directly with farmers. The best way to teach county workers is to teach farmers with county workers present. If the economist isolates himself and only works with those who work with farmers he is not in a position to develop programs for those who do. He must work directly with the people to know the critical points that prevent action on the part of the people. He cannot perfect his teachings without experience with the final group he is serving any more than an engineer can develop a new machine without testing it under the conditions it will be used.

In individual farm and home planning one of the important problems is to plan the farm for the particular individual operating it. To make plans for the farm assuming average management misses an important part of the problem which county workers must learn if they are to be effective in the individual farm planning.

The environment should be set up so that the individual himself discovers the answer. This involves making pertinent economic data available to the individual in simple understandable form. It is better to show the data which answers a question at a critical point than for the economist to tell what the data show. A table or chart acts as a demonstration plot which can be appraised impersonally by the individual or the group. A statement of the economist cannot be discussed so impersonally because the statement is tied to the individual present. People must participate to learn.

All means of communication are useful in extending economic information, but certain types are better adapted to certain problems than others. Some types of work lend themselves to mass media. Other types require the individual or small group approach. If individual farm planning is selected and it requires the individual or small group approach then we should use this approach and limit the size of the activity. I once knew a farmer who bought only enough nitrogen fertilizer to properly fertilize

ten acres. He then decided that if it was good for the ten acres, he would spread the amount he had purchased for ten acres over the entire field of 40 acres. The result: it reduced his yields. I sometimes think that we attempt to do this in extension with limited personnel. Some activities require a certain amount of personal contact and we had better limit the activity and do it the most effective way rather than writing a bulletin or appearing on television or using some other mass media which does not give results for the particular type of activity. On the other hand, to use only the individual approach for activities which lend themselves to mass media is equally ineffective.

Economic activities should be properly timed. The farmer harvests his oats when it is ripe and not at his convenience. The hog and cattle outlook needs to be given before the farmer breeds his sows and buys his cattle—not afterwards. The farmer wants to know about keeping farm accounts at the beginning of the year. He wants information about starting up a cooperative when he is setting up the cooperative. He wants public policy information when the public problem becomes an issue and before he has taken a definite stand. This takes advance planning and the reorganization of our way of doing things sometimes, but it is important.

Start new economic activities in a pilot county or only a limited number of counties. This provides a basis for evaluating the activity and perfecting the techniques before becoming involved on a full scale basis. Coming out with a new program that does not click is costly to a good economics extension program. It may not be as evident as coming out with a new model car that the public doesn't accept but the cost is there just the same in confidence and respect for the over-all program. We can only afford so many unaccepted models.

Summary

The underlying philosophy that extension education should help farm families to help themselves underlies the principles set forth in this paper. It recognizes that certain of the principles which apply to general extension work apply equally to economic extension. However, as we move into economic problems involving questions of choice, it should be recognized that a different set of principles is involved than in dealing with the physical sciences and problems of use. In questions of choice more attention must be given to approaches which allow for the variations in each individual's marginal resources and social values. These approaches involve the teaching of the process of decision making, of setting forth for the individual or group the alternative solutions, and of analyzing the consequences of these solutions, leaving to the individual or group the final judgment. As we move from individual to group problems these approaches become increasingly important.

DISCUSSION

RAYMOND BENEKE
Iowa State College

I am directing my remarks to extension teaching in farm management, because this is the area I feel most competent to discuss. My experience is that of an undergraduate teacher and research worker in farm management. Emphasis should be placed on the similarities in the problems confronting the undergraduate and extension teacher rather than the differences. Both groups ought to be concerned primarily with teaching the application of economic logic to decision making. Certainly the appropriate body of economic logic is the same both in the college classroom and in the extension meeting. The problems differ principally in the methodology employed because of the differences in the circumstances under which we do our teaching. In this connection Professor Bottum's reference to the liberties permitted those who work with captive audiences is intriguing. I do not know what meaning Bottum attaches to the term but some of his colleagues in extension use it to refer to the undergraduate trapped in his classroom. The so-called captive audience is largely the creation of imaginative extension workers. The classroom teacher who fails to teach useful economic principles and to present relevant corollary data over the long run will see his classes shrink in size and his farm management courses eased out of the curriculum. So in this respect, too, the problems in undergraduate teaching parallel those of the extension worker with a demanding, impatient audience.

If the tenor of Bottum's remarks is interpreted correctly, one of his chief concerns is the focusing in teaching on the process one must go through in solving problems rather than on giving the solution! The blueprints for applying an orderly process to decision-making in farm production are the principles of production economics. Emphasizing economic principles gives teaching permanence. It eases the difficulties arising out of variations among farms in the resources that are available and in the ends the family seeks to maximize. It helps to define the economic facts which bear on the particular problem under consideration. It multiplies the impact that can be made with limited resources upon the efficiency with which farm resources are used.

The economics of production involves only a few fundamental principles. The concepts that are basic can be counted on the fingers of one hand. From this standpoint teaching farm management is simple. The perplexing problems come in teaching students to make application of principles to the great diversity of problems encountered in managing a farm. In my undergraduate teaching it was found that it is not unusual for a student who has developed facility in manipulating economic models in the abstract and in applying them to a few well-defined problems to abandon his economic tools when confronted with real problems in a farm setting. Presumably the extension worker encounters the same difficulties.

The troubles that individuals experience in applying economic analysis argue strongly for the problem approach in teaching that Bottum advocates. A man with a problem presents an excellent teaching situation. However, there are some dangers inherent in this procedure that ought not be overlooked. This is especially true if we adhere rigidly to Bottum's dictum that we must provide the data that will permit the individual to arrive at an answer.

Discretion must be exercised in the problems selected as vehicles for teaching the application of economics. If the selection is made solely on the basis of farmer interest and "felt difficulty," then important problem areas will pass by default. I would extend the hypothesis that the management problems of which farmers are the most acutely aware are not always those that have the greatest importance from the standpoint of resource efficiency and income on their own farms. Of course, the selection of problems in undergraduate courses is not always on the basis of what students want or feel is important. The instructor makes his own selection. But even in using this approach there have been failures often in the past to give sufficient emphasis to applying economic analysis to a number of important farm management problems. Following a similar approach in extension likely would lead to the same difficulty. There is a tendency to focus attention too sharply on a few overworked applications such as the optimum level of feeding grain to dairy cows, the optimum rate of fertilizer application or the least-cost combination of feeds in the livestock ration. These are not the most important decisions confronting the farm manager. The manner in which a farm operator allocates limited capital among machinery, livestock, feed, buildings and fertilizer, the combination of machinery and labor he selects or the manner in which he allocates his labor among many competing uses during the busy spring and summer months has much greater significance from the standpoint of profits than the degree to which he achieves the optimum level of feeding grain to his dairy cows or finds the optimum combination of protein and grain in his hog ration. The principles of profit maximization apply to the first category of decisions just as surely as they apply to the second group.

The student or farmer is supposed to recognize these broad applications and extend to them the principle he has learned through dwelling upon our well-worn illustrations. However all too often this transition is never made. We tend to concern ourselves too much with problems for which reasonably accurate data is available of a type that lends itself to the application of the principle we are attempting to teach. We shy away from many important applications because we lack refined empirical estimates of the appropriate production functions and must grope toward a solution of the problem using estimates that are crude and unsatisfactory.

Certainly, the availability of satisfactory data should not be the criterion for selecting the applications of economic analysis that we teach. I agree with Bottum that we should strive to provide farmers with the data they need to solve their problems. But where we fail, we can be reasonably sure that farm resources will be allocated more efficiently if the decision maker recognizes and applies the appropriate logic to his problem using his own crude estimates than if he lacks both the economic framework and the relevant production data. The challenge is to extend facility with economic principle beyond their application to a few neat problems drawn from areas where we are well supplied with data to the broad range of management problems that confront farmers in making decisions. This means broadening illustrations to include many applications where we may be dissatisfied and uneasy about the underlying estimates of costs and returns. It means practice and follow-up in an actual farm setting whether the student be an undergraduate or a farm operator participating in an extension program, so that he learns to recognize the principle appropriate to the solution of a problem as it turns up repeatedly in different places and in different clothes.

Now to return briefly to the shortage of appropriate data that so often frustrates us in teaching the application of economic principles. Currently there is more data that will aid farmers in applying economic logic to their decision making than ever before. Of course, the inventory is far from complete; indeed, it would be unrealistic to anticipate that it ever will be. However, we reasonably can hope to improve greatly upon the existing situation. Much of the information needed can be supplied most efficiently by cooperative efforts with experimentalists in agricultural engineering and in the plant, soil and animal sciences. The growing teamwork between production economists and other agricultural scientists is one of the most heartening and productive research developments in recent years. But, there are still many crop rotation experiments, feeding trials and fertilizer test plots supposedly aimed at helping farmers make decisions that miss their mark for lack of proper design and interpretation. Too often these experiments describe and compare only a single point on several production functions rather than provide an estimate of the relevant range of a single production function. A more effective use of the resources now frittered away in mis-directed activity could make a substantial contribution to the stock of needed input-output data. No one has a greater stake in a concerted effort to encourage a more effective harnessing of experiment station resources than the farm management specialist. And, because, of his close contact with management problems at the farm level, no one is in a better position than he to press experiment station workers to design experiments that will increase the usefulness of technical data in making farm management decisions.

Turning briefly to one further point, Bottum has quite properly emphasized the need for recognizing ends others than profit maximization that condition the actions of farm families. Just recently I helped with a farm and home-planning workshop in our State in which most of the participants were Home Demonstration Agents. This group repeatedly set forth the idea that farm management extension workers are interested only in helping farm families make more money. While this is not true, somehow this impression is left with many of the people with whom we work.

What is the extension workers' responsibility in this complex area of values and ends? Certainly it would not be proper for them to tell people what their goals ought to be. But they do have a responsibility to help farm families define and clarify what they want their farm business to accomplish. It is especially important that they aid them in recognizing where their goals are competitive. There are few farms on which the problem of conflicting ends does not arise. Increasing leisure, reducing risk, furthering personal satisfaction ends such as elaborate machinery and buildings, purebred herds that do not fit the resources of the farm all are in conflict with maximizing profits. Our economic tools can be useful in helping people estimate the income they sacrifice to indulge ends other than money making. But once family members recognize these relationships the final choice among goals should be left to the family. The responsibility then becomes one of helping provide them the tools to utilize their resources efficiently in working toward the goals they have chosen.

HOW EXTENSION PEOPLE CAN USE "RECENT" ECONOMIC PRINCIPLES INCLUDING MARGINAL CONCEPTS

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The Need For Self Evaluation

IF AN accurate study was made of the proportion of extension economists time spent in planning and preparing the presentation and in the actual presentation of economic principles, I'm sure most of you who are not extension economists would be surprised to find that most of our time is spent on other activities. This is primarily because of four reasons: (1) We spend entirely too much time answering routine letters in response to specific questions on which sufficient information rarely is supplied, viz., rentals, leases, cost of operations, storage, custom rates, etc. (2) We are expected to perform too many routine activities of a simple descriptive cost-price nature, the content of which is also questionable. (3) A large proportion of our time is spent in traveling to and from meetings throughout the state. (4) There is a continued strong emphasis upon evaluating the effectiveness of extension work in terms of the number of people attending meetings, number of days spent in the field, and number of miles traveled.

I will not comment further upon the first three points, but I believe the fourth point concerning evaluation is worthy of additional serious thought. It is my opinion that modern means of communication have so greatly expanded Extension's opportunity to accomplish effective education that not to completely exploit these media is very short sighted and as ridiculous as the fringe-topped surrey on the Pennsylvania Turnpike. If extension fails to fully utilize all effective means of communication it will be limiting its proper growth in effectiveness and stature. This is particularly true where failure is made to completely exploit all TV opportunities. Don't misunderstand me, I very well know from experience the severe limitations of doing effective educational work through commercial stations where you are given 5 to 7 minutes to discuss, for example, the "Advantages and Disadvantages of Flexible and Rigid Price Supports As They relate To The Wheat Producer In The U. S. And To The President's Foreign Aid Program." And also I realize that there are large areas of the U. S. that do not yet have TV coverage. However, a few states are making excellent use of educational TV in their extension work and more stations are on the way. It is my opinion that if TV is to be an effective

educational tool it must be a regularly planned activity, not something sandwiched into an already overloaded work program.

I am certain that, where TV reception is available, it will to a large extent soon replace many of the farm meetings that we are now holding. I say this because of three reasons: First, there are so many meetings nowa-days that it is difficult not to have conflicting activities. If there is a conflict, I need not tell you which activity they will choose. In other words, we might as well recognize that farmers, as well as ourselves, would rather be entertained than educated. Therefore, if Extension expects to educate, we specialists must do it in an entertaining way and under pleasant conditions. Second, many specialists make poor presentations—we are often too textbookish, our narrative is too rambling and often our enthusiasm is less than consuming. Many times it is very difficult to hear the speaker because of atrocious acoustics and visual aids, if there are any, are often too small and too difficult to see or to understand. Third, it is becoming increasingly more difficult to get people to attend meetings because of poor meeting places and facilities, and because of the home comforts and the TV entertainment that persons must forego if they attend an extension meeting.

Let's be realistic. We know that farm meetings are not a thing of the past—we will continue to hold many of them. But let's recognize that we can not conduct our meetings nor present our materials in the same way that we did 25 years ago and expect satisfactory results. Let's not lament that we are in an unfavorable competitive position with new media and new techniques, but let's use these new tools to make our work more attractive and therefore more effective. We must continually think up new and better ways to illustrate how farmers can use those economic principles that are important for profitable farming. The task of presenting economic principles so that farmers will understand them is not easy because economics is abstract.

Economists do not have physical specimens that one may observe. We are dealing with abstract concepts. Agriculture is becoming more and more complex and commercialized. Therefore, it is increasingly important that we effectively illustrate these economic principles in terms that farmers can use in their farm business. When it comes to illustrating economic principles, the old adage of "a picture is worth 10,000 words" was never truer. The objectives of the remaining portion of this paper are (1) to illustrate how some economic principles may be presented to farmers in meaningful terms; and (2) to emphasize our need for new techniques that can be used to economically integrate farmers' limited resources.

Demonstrating and Illustrating Economic Principles

Diminishing Returns

To get into the heart of my topic, let's start with the economic principle of diminishing returns. How can extension workers present this concept so that it will have real meaning to farmers—i.e., in terms that they can apply to their individual farm business? To illustrate, farmers ask the general question: How much fertilizer should be applied to corn? From our agronomist we learn that different soils respond differently to varying rates of fertilization. Knowing our physical input and output data—and never forgetting to explain its limitations and the conditions and assumptions upon which it is based—we can show farmers a response picture under given conditions. We could show them the picture or diagram of the "law of variable proportions," (Fig. 1) explaining that the top curve is the total product curve, that the dotted flat curve is the average product curve and that the dashed sharp curve is the marginal product curve. We could show that the calculus of increments of inputs eventually results in decreasing increments of output. But should we expect farmers to understand this technical terminology?

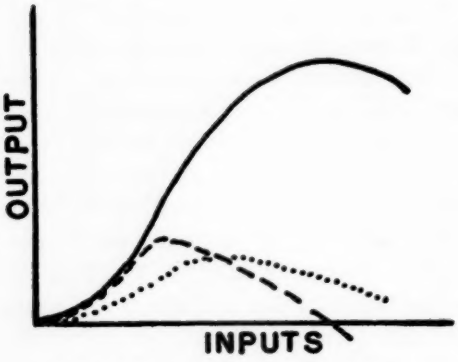

FIG. 1.—THE LAW OF VARIABLE PROPORTIONS

If we were to illustrate diminishing returns through the economic use of nitrogen fertilizer, farmers would be able to see how they could apply this concept to their farm business. Chart 1 shows that when 40 pounds of available nitrogen (40# N) is applied to corn under certain conditions, per acre yields, will increase by 12 bushels; when 80# N is applied, per acre yields will increase by 19 bushels; when 120# N is applied, per acre yields will increase by 20 bushels. The cost of nitrogen will be $6.68, $13.36, and $20.04 and the resulting returns above the cost of nitrogen will be $8.32, $10.39 and $4.96 respectively. The additional costs of applying the fertilizer and harvesting the higher yields will be minor and are not considered in this example.

This part of the analysis is elementary and is used rather generally by many agronomists and economists to show that additional N should be added so long as the total returns from the N are greater than the cost

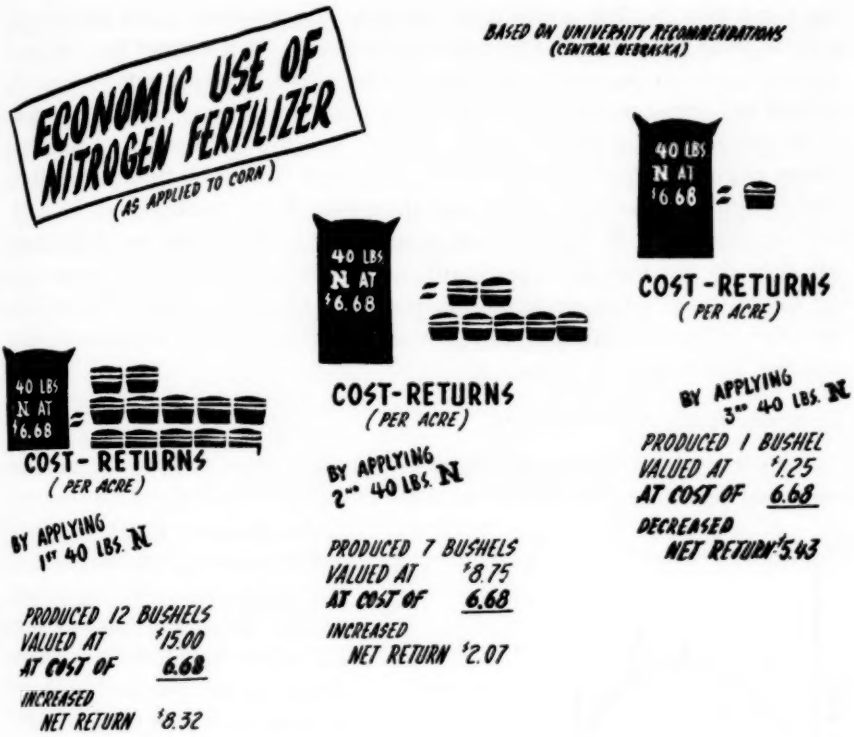
ECONOMIC USE OF NITROGEN FERTILIZER
(AS APPLIED TO CORN)
BASED ON UNIVERSITY RECOMMENDATIONS (CENTRAL NEBRASKA)
40 LBS N AT $6.68
COST-RETURNS (PER ACRE)
BY APPLYING 1ST 40 LBS. N
PRODUCED 12 BUSHELS
VALUED AT $15.00
AT COST OF 6.68
INCREASED NET RETURN $8.32
BY APPLYING 2ND 40 LBS. N
PRODUCED 7 BUSHELS
VALUED AT $8.75
AT COST OF 6.68
INCREASED NET RETURN $2.07
BY APPLYING 3RD 40 LBS. N
PRODUCED 1 BUSHEL
VALUED AT $1.25
AT COST OF 6.68
DECREASED NET RETURN $5.43

Chart 1.—Economic use of nitrogen fertilizer

of it. Thus they tell farmers: if your soils are expected to respond in similar manner, you should apply 80# N per acre to corn for the greatest returns-above costs per acre. But we should not stop at this point of the analysis. This is only one possible alternative. There are other considerations that are of economic importance to many farmers. What is the farmer's financial position? Are capital resources limited or unlimited? Are land resources limited or unlimited? Answers to these questions will determine whether the 80# N level is the proper choice or whether he should choose some other rate of fertilization, or if he should fertilize at all. We have not considered the question whether he should invest in fertilizer, feed, machinery, livestock, etc. That is an economic choice that has been made consciously or unconsciously prior to considering intensities. Knowing his personal financial and resource situation, and knowing the rate of return from expenditures for N, the farmer will be able to determine which level of fertilization, if any, is most economic for him. According to our example, the rate of return over the cost of the 40# N application is 125 percent; for the second 40# N, it is 31 percent; and for

the third 40# N, it is a minus 81 percent. The greatest dollar return per acre is from the 80# N application. Obviously, if a farmer has limited capital, and can purchase only enough fertilizer to apply either 80# N on half the corn acreage or 40# N on all the corn acreage, for the greatest economic return he should apply 40# N to all corn acreage. Thus the return per dollar spent is maximized. Of course it may be that some other rate of application–(say) either less than 40# N or greater than 40# N, but less than 80# N would result in an even greater response. However, our data do not include other points on the curve. But if land resources are limited and a farmer is able to purchase all the fertilizer he wishes, then the most economic rate of application will be 80# N because at this rate the "net" return per acre is greatest.

Economic Rates of Substitution

Complementary and Competitive Production: Now to turn to another economic principle–the economic rates of substitution. How do you explain to farmers the significance of complementarity and competitiveness of different crops? We might visualize this principle by showing them Fig. 2 which shows the complementarity and competitiveness of farm crops in production and utilization. To the left of point X is the complementary range and to the right is the competitive range of production. Assuming all crops are sold, where a price line is tangent to the iso-resource curve, that is the most economic combination of a given quantity of limited resources.

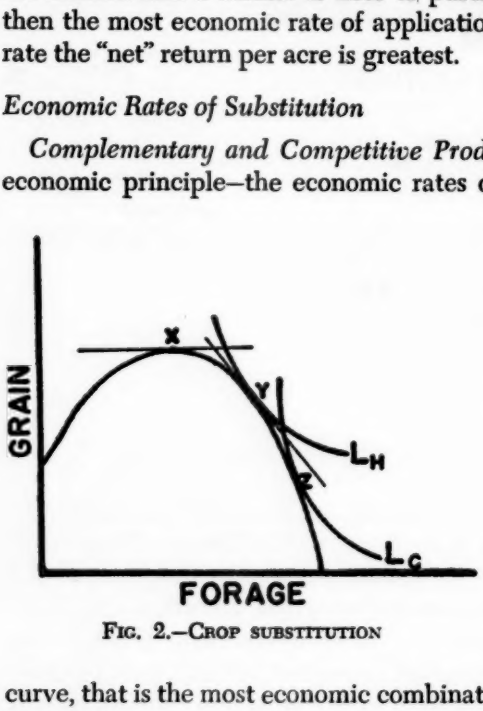

FIG. 2.–CROP SUBSTITUTION

If we have a livestock program to utilize the forage, curves L_H and L_c are isoproduct curves that represent two different livestock systems that would produce a given product. The livestock system (say hogs) represented by L_H would require more grain and less forage than system L_c (say cattle) which would require more forage and less grain. Points Y and Z indicate that the rates of substitution of forage for grain in production (slope of curves L_H and L_c) are equal to the rates of substitution of the two feeds in producing a given quantity of livestock product. (You note that I do not use the word "marginal" when referring to the "rates of sub-

stitution." Doesn't economic substitution always take place at the margin?)

But would farmers grasp the economic principle that has been illustrated in Fig. 2. I suggest that we can, with a little imagination, think up illustrations that will more vividly drive home this important principle and that we should not attempt to force a college course in economics on farmers at one sitting.

Here is a quickie figure which I'm sure any one of you can improve with a little thought (Fig. 3). It shows that the total feed production in the hilly area of the Corn Belt in northeastern Nebraska,[1] in terms of feed units,[2] reaches a maximum when from 20 to 40 percent of the rotation land is producing forage crops.

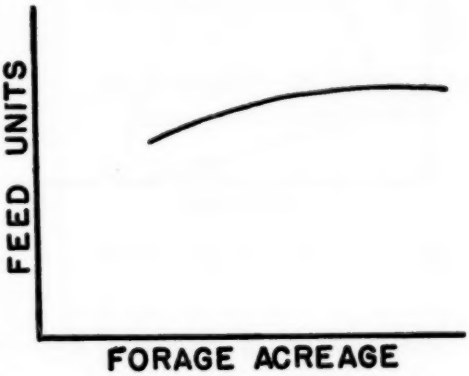

Fig. 3.—Feed production

The important principle that should be emphasized is the relationship between the livestock enterprise and the type of rotation on the farm. This can be effectively demonstrated in terms that farmers can understand if it is put this way: What kind of rotation should I have on my farm? (See Chart 2.) When there are no forage crops in the rotation, yields can be expected to be low and erosion severe. By adding a small acreage of some forage crop or crops to the rotation in the form of hay or pasture total feed production may increase. The inclusion of some forage in the rotation will increase the yields of grain crops which will more than offset the loss in feed from acres taken out of grain. But eventually, as more and more acres are shifted from grain to forage production, the total quantity of grain and feed units will decrease. The rotation that a farmer will chose will depend upon whether he plans to produce for the cash market or plans to feed his crops to grain consuming or forage consuming livestock.

Substitution Of Grain For Forage In Feeding: There is another economic problem that is of importance to livestock men. The problem is this: To what extent are concentrates and roughages substitutable for one another in feeding? As far as I am aware, there has been very little research on this problem of feed substitution.[3] It is generally implied from

[1] Howard W. Ottoson, *Economic Analysis of Forage Production and Utilization in Dakota and Dixon Counties,* Nebraska, Univ. of Nebr. Agr. Exp. Sta., Res. Bul. 173, 1953.

[2] One feed unit is equal to the equivalent in feeding value of one bushel of corn.

[3] Earl O. Heady and Russell O. Olson, *Substitution Relationships, Resource Require-*

standard text books on feeding that the ratio is one to one on a TDN basis, but economists know that the law of variable proportions is also operative in feeding. To illustrate this point let's use the problem of the economic substitution of grain for forage in a dairy ration.[4] Fig. 4 shows that a given milk production—the isoproduct curves—is obtainable from several combinations of grain and forage. The line A B represents the animal's body maintenance requirements—the amount of feed necessary to maintain her before she produces any milk. The curve A C indicates that for any given quantity of grain in the forage, a minimum quantity of forage is necessary to prevent her from becoming ill. The line B C indicates that a cow can eat only a limited quantity of grain and forage —she simply will not eat any more—her stomach can hold no more.

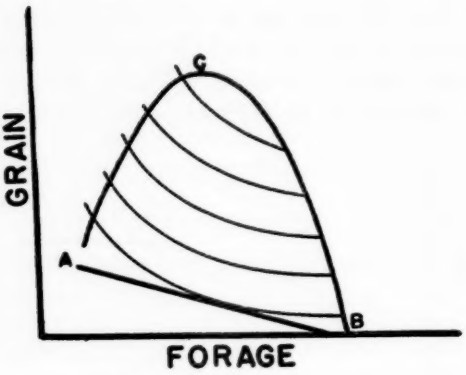

FIG. 4.—FEED SUBSTITUTION

The economics of substituting grain for forage can be clearly illustrated

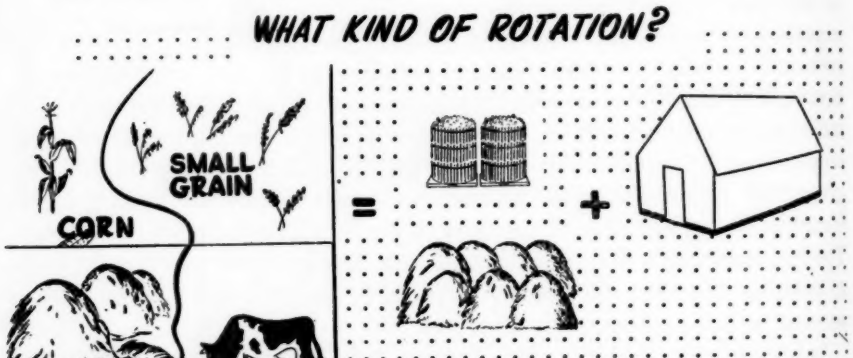

CHART 2.—WHAT KIND OF ROTATION?

ments and Income Variability in the Utilization of Forage Crops, Iowa Agr. Exp. Sta., Res. Bul. 390, September, 1952.

[4] Curves in Fig. 4 are similar to a figure in Lawrence A. Bradford and Glenn L. Johnson, *Farm Management Analysis,* John Wiley and Sons, New York, 1953, p. 245.

to farmers if we take a specific case. If we add to the present daily ration of a particular cow (say) one pound of grain and four pounds of forage, this cow will produce an additional (say) three pounds of milk daily (see Chart 3). If the farmer is receiving $3.50 per cwt for fluid milk, the three pounds will be worth 10 cents. Assuming corn to be $1.40 per bushel and alfalfa hay $15.00 per ton, the cost of this additional feed will be 5½ cents,

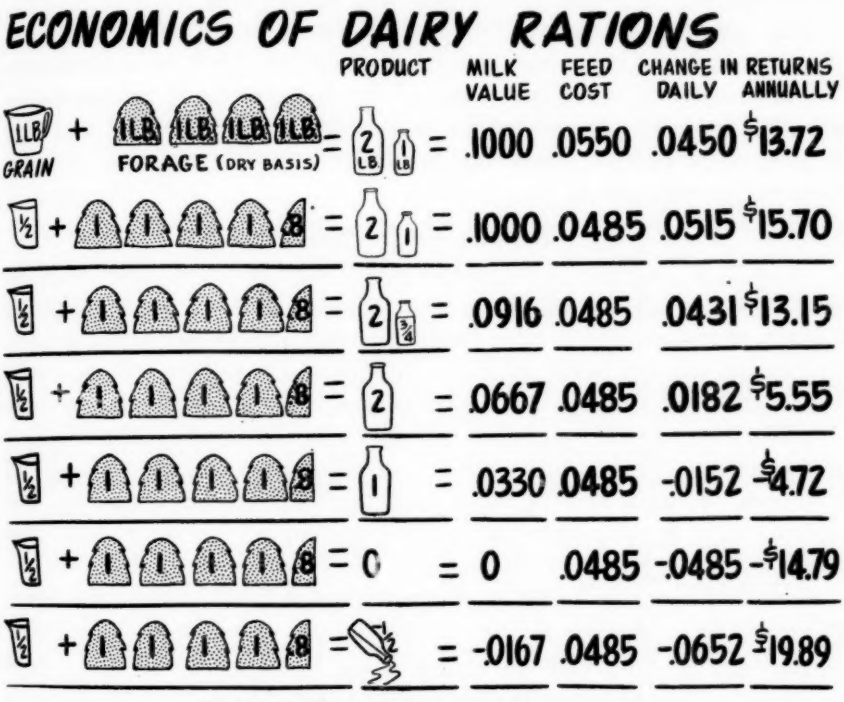

Chart 3.—Economics of a dairy ration

leaving a daily return above the cost of feed of 4½ cents. The annual increased "net" return (305 milking days) will be $13.72 per cow. But if in that five pounds of additional feed (1 lb corn and 4 lbs hay) we substitute hay for one-half of the grain (maintaining the total amount of TDN—the usual method of comparison—Morrison's *Feeds and Feedings*) we find that it will take 0.8 pounds of alfalfa hay to supply the same number of TDN as in one-half pound of No. 2 yellow corn. Thus our new "dairy feed mix" will be composed of ½ pound of corn and 4.8 pounds of alfalfa hay. If this lower concentrate feed mix (5.3 lbs) is fed we find that milk production will increase by the same amount (3 lbs) as when she was fed the richer grain ration. As a result of the cheaper ration, the annual returns above the cost of this feed mix will be $15.70 per cow—assuming all prices the same. But as we continue to feed more and more units of this dairy feed mix

(½ lb corn and 4.8 lbs hay), production per unit of feed input diminishes until eventually milk production declines because of overfeeding and because of the limited capacity of the cow's stomach, etc.—resulting in an economic loss. The point at which we should stop adding more of the identical feed mix to the cow's ration is the point at which the cost of the last quantity of feed is equal to or less than the value of the milk resulting from the feeding of this last unit of feed mix.

This presentation has dealt only with farm management problems, but the types of illustrations used need not be confined solely to farm management. I suspect that the techniques of the presentation of subject matter in other fields of Agricultural Economics has not yet reached that high degree of perfection where the principles are always clearly and unmistakably understood.

Improving Our Results

Thus far I have been discussing concepts related to economic problems and showing ways in which we may attempt to drive home particular important economic principles. But a demonstration in itself is not enough. We should not stop with the demonstration because there still remains a tremendous gap between the farmer's concept of the relationship of cause and effect and his understanding of how he can manipulate the economic and institutional forces that must be considered before making managerial decisions. We must develop better techniques for arriving at answers, and also we must develop better techniques for helping farmers to learn how they can fit the parts of their business into an economic unit.

Now that Congress has granted the Extension Service additional funds there will be increasing pressure to attack farm problems from the "unit" approach. This is as it should be, but it will be most difficult for many of us because much of our work has been on an enterprise basis. To approach it differently will require learning new ways of thinking and working.

For the past six or seven years and particularly for the past three, there has been developing a new technique for solving complex problems that will be applicable to farm planning. This new technique is known as *activity analysis* or *linear programming*, or *mathematical programming*. Whatever you call it, it is sufficiently broad to include all possible combinations of complex economic problems.

The data required in *activity analysis* are essentially the same as those used in conventional *budgeting*, but "Like the theory of games, it is a method of pure mathematics that can be applied to human affairs. It is used to calculate the best possible solution to a problem that involves a number of variables."[5]

[5] A. Charnes and W. C. Cooper, "Linear Programming," *Scientific American*, August, 1954.

Many of us in farm management work realize that on many farms prices play a very minor role, if any, in determining the allocation of resources and in the combination of these resources. Restrictions on available resources and other limitational factors that farmers are unable to alter are the principal determinants of how resources are combined on farms. Prices play a minor role in this determination. Two examples: 1) the quantity of hay that a farmer produces may be restricted because of the limitation of labor available for haying. 2) The failure of a farmer to have a beef enterprise on his hilly farm may be the result of his being unable to obtain the capital necessary to acquire sufficient land to maintain a herd large enough to provide him the income he needs. Even if he has the land resources he may still be unable to finance the purchase of a sufficient number of breeding stock. The outstanding advantage from using the technique of *activity analysis* in farm planning compared to conventional budgeting is that these limitations—resources, time, technology, etc.—enter into the planning and register their proportionate weight in any conclusion.

It should be clearly understood that *activity analysis* in itself is nothing more than pure mathematics; it does not replace the need for economic theory and good judgment. It is simply a powerful tool that has tremendous potentiality in helping us arrive at more accurate and meaningful answers. And of course, the answers one deduces from *activity analysis* can be no better than the data or information upon which it is based. We still need accurate input and output data. Once the "model" for your problem is set up the computations are simple high school algebra.

I anticipate that the states that will do the most effective and lasting work in the unit approach to farm planning will be those which incorporate *activity analysis* in their planning. It may actually be that the demands of the Extension Service for answers will be the motivating force behind the further refinements that are necessary for the quick adaptation of this technique to farm planning.

I have demonstrated for you various types of charts and displays we can use to improve our techniques in presenting economic principles in understandable terms to farmers. I am sure that many of you are now doing an excellent job. Such demonstrations for farmers are not enough. We need to develop better techniques for arriving at the answers to farmers' problems and I believe that *activity analysis* is such a tool. No one device, technique or method of doing a particular job is sufficient. We need to adopt, to adapt and to improve all the modern educational means that are at our command.

DISCUSSION

L. F. MILLER
Oklahoma A. & M. College

It is refreshing, if not very encouraging, to have a member of the profession make such a frank evaluation of the use of that personal resource—time. Mr. Ford assumes that the questionable use of part of the extension economist's time would be surprising to the rest of us. I doubt that this is the case, however, because those of us who are closer to research and teaching find ourselves in much the same position. Personally, I am glad that Mr. Ford digressed enough to raise this issue, because it happens to be a point of real concern to me. Some of us have worried too much about improving other peoples' efficiency and far too little about our own. Of course, we all must perform many service activities, but in some cases at least, these seem to have thrust themselves upon us until our basic program has become buried under a mass of services and details. Isn't it possible to develop a schedule of work—as we suggest for others—and then make it work? Without sacrificing our service obligations, we can, if we add enough determination, find a surprising amount of time each week to hide away for some constructive and satisfying work. If custom and institutional arrangements are limiting such a move, it is suggested that we build a factual record of the present situation and then take up the problem with our administrators. Many of them will be most receptive to the suggestions for changes which will lead to greater accomplishment.

While I am in agreement with much of what Ford has said regarding the principal question to which he has addressed himself, I was somewhat disappointed on one count and skeptical on another. My principal disappointment was the emphasis in the paper on some of the economic principles and concepts which are useful in Extension, rather than on the teaching methods and programs which will insure that these principles become an integral part of the decision-making process. Is it not possible that those concerned with business decisions have at least a practical appreciation for such concepts as diminishing returns, resource substitution, and opportunity costs? If so, perhaps the major deficiency in our work is the lack of a general framework within which the farm operator or business manager can place the relevant variables to help him arrive at more intelligent decisions for his particular situation.

At the risk of being elemental, the writer would like to point out that one of the really basic techniques for problem solution which is needed to keep constantly before our farm people in extension education and in our classroom as well, is that old approach known as the partial budget, broadly conceived. If such an approach were made an integral part of the decision-making process of our farm operators, a long step forward would have been taken in the education of our farm people in the field of economics.

Imagine, for example, that before making a new investment, or otherwise adjusting their business, farm operators seriously asked themselves, "If I make this change, what costs on my farm will be increased and by how much, and what revenue items in my business will be affected and by how much?" If farm operators had such a practical working concept of marginality, and if our research work were geared to providing relevant physical and economic data to help make accurate estimates, I doubt that we would need to be seriously concerned about their use of our economic principles, *per se*. These principles

would become working tools in the decision-making process, even though our professional terminology were kept under lock and key.

No assumption should be made from the foregoing that there is not need to provide management with as many "ready-made" answers as possible to such questions as the most profitable level of feeding and fertilization, or the least-cost combinations of resources where such answers are meaningful. Unfortunately, however, it is known that many of the really important decisions the individual operator must make are much too involved, too bound up with uncertainty, prejudices, and subjective family goals, ever to hope to read the correct decisions from a rule book.

Also it is obvious that the partial budget is no substitute for complete farm and home planning. However, if there is failure to develop some ability on the part of the farm family to make the necessary continuing adjustments that will be required in carrying through any complete farm plan, one of the real educational opportunities in our expanded farm and home planning programs shall have been missed. Again, isn't the partial budget the most useful approach to many of these continuing adjustment problems, and will not those farm operators who appreciate its use be the most receptive to complete farm and home planning?

The development of a true appreciation by farm operators of marginality must start with a broad understanding of its application by extension specialists and county agents and must be supplemented by casting more of the extension publications in such a framework. If instead of attempting to give so many definite answers to economic problems, there would be success in getting farm people to analyze their more complicated decisions in terms of a budgeting approach adapted to their particular situations, the educational efforts would be on a sounder basis. This is far easier said than done, both in resident teaching and in extension, but some states are making real progress along these lines, although in others there is scarcely any effort in this direction.

My principal point of skepticism in Ford's thought-provoking paper deals with his anticipation that ". . . the states that will do the most effective work in the unit approach to farm planning will be those which incorporate activity analysis in their planning." Recognizing that this research technique will prove of real value to farm planning, I doubt that five years from now it will be possible to find much positive correlation between the amount of resources devoted to activity analysis as such and the degree of extension success in farm and home planning.

Activity analysis if properly used by research workers, will provide extension personnel with more "ready-made" answers of direct interest to farmers, as well as more and better guide-posts on optimum enterprise combinations. But such guide-posts must still be considered as such, not as the final answers for the individual farm family. Hence, the extension specialist, instead of going home and digging out his mathematics books, perhaps might as profitably buy a good text on social psychology and the principles of learning. This might enable him to develop teaching techniques and programs which would help farm families think through their own solutions to their particular problems in line with their own economic and family situations. Perhaps we can be optimistic to the extent of hoping that we shall do at least a little of both.

AGRICULTURAL ECONOMISTS WORKING WITH INDUSTRY

Chairman: Frank L. Parsons, Federal Reserve Bank of Minneapolis

HOW SHOULD THE INDUSTRIAL ECONOMIST OPERATE FOR THE BEST LONG-TIME RESULTS?

HENRY B. ARTHUR
Swift & Company

TO TACKLE the subject assigned is certainly presumptuous, and I must immediately confess that as I began thinking about what should be said, I was much more impressed with the problems to which I have no solution than I was with any prospect that an easy formula can be developed which would have universal application—or even work perfectly in just one little individual case.

Whatever is offered is presented in the hope that it will be stimulating. It is certainly not presented with assurance that there is any pat answer.

Functions

If he is to be effective, the industrial economist must operate with a sharp focus upon the total job to be done by his firm or organization. He cannot aspire to a private ivory-tower apartment set aside from the workaday tasks of the business. To be specific, he must recognize that his company is in business to make a profit, that it is going to succeed by the soundness of its decisions, and by policies which enable it to turn in a record of excellence surpassing that of its competitors.

Let's look at some of these elements for a moment. Often I have been asked if it isn't a difficult situation to depend for a livelihood upon being a crystal-ball gazer. It was not entirely a defensive attitude that led me to respond the other day to such a comment by asking a series of questions of the executive who had made it.

"Does your job require you to make decisions, or to take action?" was the first question. The answer, of course, was "Yes."

The second question was "Are your decisions related entirely to the past and to the present, or do you try to make decisions that will be valid in the future?" The answer was obvious.

Third question was "When you think of the factors that ought to be taken into consideration, do you try to visualize what those factors will do in the future, or are you satisfied with simply looking at the latest historical records and accounting information?"

By this time, my friend was about convinced. He was ready to believe me when I suggested that the role of the economist was one of exploring many of the same problems as those faced by the company's executives,

of trying to determine what factors were important in the decision-making process, and of trying to analyze those factors in terms of their past behavior and relationships in such a way as to get the best possible appraisal of their significance for the future. It is almost possible to say that the businessman, not the economist, is the forecaster, and that the humble position of studying those measurable facts of the past and present is the economist's role as he tries to assist the man who is really bearing the brunt of the forecasting job.

If this gives you a quick idea of one of the ways in which an economist must function as a member of a management team, it has served my immediate purpose. His job is to help improve decisions. It is as simple as that. Yet it is as important as it is to "keep your eye on the ball" in an athletic sport—and incidentally, it is ignored almost as often.

Organizational Arrangements

Where should the economist fit in the total company organization? There is no pattern of organization that would work in all companies. Sometimes the economist operates as a single individual serving as consultant to the company president, to a finance or executive committee or to some other individual in the company, perhaps the controller or the treasurer. This is a more frequent situation than the one which exists in Swift & Company where the economist is listed as an officer of the company and any professional hope he might have of conducting profound economic analysis is pretty well stifled by the fact that he is responsible for operating a rather substantial service organization designated as the commercial research department.

I have an impression that the individual economic consultant, working alone or with one or two assistants and attached to some high officer of the company, is the most frequent pattern. This is true in most banks, commercial and industrial establishments. However, the particular pattern with which I am most familiar is at the other extreme. Since our department encompasses most of the functions of the individual economist as well as the broader service functions, it will be enough if I outline our set-up and operations.

We have a department of approximately 60 people. The range of problems which they tackle varies all the way from editing the company's annual report, or the analysis of by-product yields from specific weights and grades of livestock, to assisting in explaining the farmer's share of the meat dollar, or whether to own one or a dozen trainloads of pork.

The major activities of the department lead our employees—most of them agricultural economists, general economists, or school of business graduates—in the direction of becoming consultants to responsible officials, department heads or vice-presidents of the company.

Our department reports directly to the President of the Company although as a service organization we work on projects for a great many of the commercial and operating ends of the business. As a part of an earnings-conscious business organization, the expenses of research are shouldered by those divisions of the business being served. In fact, the projects and studies are undertaken only after agreement as to the probable expense. The actual charge of this expense is placed directly against the departmental income of those we are serving and if they are not satisfied that it is paying off, they are at liberty to cancel the service.

This arrangement has a great deal to commend it and might be employed outside of business organizations to very good effect.

Comments on Techniques of Operation

We attempt to organize research operations in such a way that the individual research worker is brought face to face with the whole problem of the business executive before he is asked to undertake a study of those elements which lend themselves to specific quantitative analysis. In this way, we feel that we are able to make our men much more effective in the business and to enable them to grow in stature much more effectively than as though someone else attempted to frame a so-called "economic question" which he thought would help him in solving a business problem. Too often, such an approach leads to a request for a forecast of general business, the stock market or the gross national product, and the executive asking it, nine times out of ten, wouldn't know what to do about the answer even if he believed what he was told would happen.

I have often put it this way: It is desirable to discuss a problem with the business executive and try to get it so formulated that the executive can say "Yes, this is my problem" and at the same time the economist can say "This statement of the problem brings out those factors which lend themselves to effective economic analysis." If a meeting of minds can be reached which covers both of these aspects, the chance of effective research is greatly enhanced.

We find it helpful to work with people all the way up and down the line. Two particular points of emphasis are that, first, the statement of the problem should be clarified as far up the line as possible. Second, the conduct of the research and the discussion of results should be handled with people as far down the line as are doing any other work contributing to the ultimate decision. In Swift & Company, we have had very few examples of the inability to establish an effective communication fairly widely in the commercial departments of the business, but the problem nonetheless is one deserving major attention.

It isn't necessary to outline in detail the specific steps that comprise a research study. This is very much the same whether it be in the academic,

the government or any other field. I have indicated the importance of stating clearly the nature and the scope of the problem. Methods have to be adapted to the nature of the problem. This reminds me of an old refrain that I heard innumerable times in studying statistics: "The purpose governs." This single phrase is more important than a barrel of assorted techniques, used at random or employed simply because the data at hand lend themselves to a particular kind of manipulation.

At the same time, there are some important contrasts between the typical academic research project and the industrial research project. The academic economist sometimes employs poetic license in his research. He can indulge in the luxury of purifying assumptions called "ceteris paribus" which are generally denied the industrial economist. This has an effect on an economist entering industry somewhat similar to the clipping of the turkey's wings—he can feed and thrive as well, but he can't range as far.

Moreover, in our type of work we strive to attain high quality, but we do not carry the study beyond the point that is necessary in order to secure a reliable decision or to answer the specific problem in hand. Sometimes it is important simply to know the direction without worrying about the degree of a probable change. Other times, a high degree of precision is required. The need for discrimination in cutting off research is almost as great as the need for conducting it in the first place, if a realistic attitude toward expenses is to be maintained. We have never been short of things to do and whenever possible, the pressure should be to turn to the next task rather than elaborate an answer already in hand.

The final stages of effective research—communicating the results, and putting them into action—plays a bigger part in the work of the industrial economist than in most non-business research activities. There is no need to elaborate except to say that we have found many of the candidates we hire to be deplorably deficient in the skills required for these crucial final steps. I don't know what the answer is, but it is certainly a major challenge for teachers of college students. The art of simplification and effective communication is a high order requirement, not something that is beneath the dignity of a college professor to spend his time on.

Kinds of Research

It should be clear from what has been said that the industrial economist generally has to spend a major part of his time on what might be termed "applied research." This is research with a well-defined problem or purpose, aimed toward specific decisions and action.

This represents the major assignment but it is by no means the whole job. Two other kinds of economic research have an important place in many firms. One of them is the so-called basic or exploratory research which seeks to discover the significance of observed facts in an important

field without any previous idea of how those facts and relationships will be used. A good many projects in this area could be mentioned, ranging from studies of the significance of advertising to analyses of the economics of internal control procedures, or the role of the executive.

It is important to mention in this connection that the economist, if he is to remain a scientist rather than a protagonist for a special interest group, should strive to keep his work on a highly objective plane. The operation of an industrial economist is not immune to pressures and temptations to become a special pleader any more than is true of economists who become wrapped up in the economics of cooperatives, of labor, of governmental control of railroad and utility rates, etc.—and I might even add, of agriculture.

A third kind of research should be mentioned, along with the applied research and the so-called basic or exploratory research just discussed. This is an important though less glamorous job which might be called "appraisal research." Many a business man asks himself the question "How'm I doing?" He is, indeed, fortunate in having a monthly profit and loss statement that gives him a pretty clear answer and one that carries a considerable degree of finality, as many businessmen discover when they go broke. However, it is important to have measurements of business elements that may not find their way into the official accounting records. How does one's volume compare with competitors? Are resources being employed in the most productive way? Is the geographic location of the firm's plants or sales outlets following the most advantageous trends in a shifting market picture? The study of questions of this kind is generally a cooperative venture. The economist joins hands with the accountant, the engineer or with the personnel department to find out whether or not some aspect of the company's operations are running off the track and if so, where and why.

Summary

It is easy to see that the industrial economist is likely to find himself dipping into many areas. Generally he finds some basic jobs that consume a major part of his effort. However, once he is personally accepted as a member of the management team, the economist's job encompasses a vast number of problems and enables him to be something of a general consultant in the fields where he himself may decide that economics has something to offer.

My final word is that selectivity is perhaps the most important part of the economist's assignment in a business organization—selection which results in applying the peculiar tools and resources of the economic science in such a way as to maximize the output of the economic input.

NEEDED TRAINING AND OPPORTUNITIES FOR THE INDUSTRIAL ECONOMIST

R. J. Eggert
Ford Division—Ford Motor Company

IT IS fairly customary for a speaker to square off behind a lectern these days and stoutly claim that we are in a new era of business—that times have changed, and new thinking is needed.

My business is measuring trends, not bucking them, so I am inclined to go along with this traditional beginning. For it is perfectly true that professional economists today are entering a new kind of work, and playing a new, major managerial role in business and industry.

What has happened is very simple. It isn't possible these days just to "play business by ear." Today, business needs men who can read the notes.

Now, if you want to look at the statistics for a minute, there are about four million operating business firms in the United States today. If every one of those firms could be persuaded to hire an economist, things really would be rosy for the economists for a while. In the short run, national unemployment would drop sharply, for I assume that everybody on the unemployment rolls would claim to be qualified economists. For the medium run, business failure would rise phenomenally. And in the long run, unfortunately, there would be a drastic business recession.

It seems to me that there is a good deal of sense in that harmless exaggeration, for it helps us to remember that there is no room for amateurism in the practice of economics in industry. The successful industrial economist gets his job done and helps his corporation succeed because he has had adequate training to fit him for his job, and he has had realistic opportunities which have strengthened his academic background through experience.

It is the purpose of this paper to explore these two areas which provide a foundation essential to the industrial economist. In addition to exploring these two areas, I want to draw upon some samples of the work we do in Ford Division which will help to clarify the training and opportunity prerequisites I have listed.

Training of Industrial Economists

The training needed by a qualified industrial economist should be divided into three general areas: The first is education. The second is teaching experience, and the third is other actual work experience.

Of course, not all three are essential in every industrial economist. But

in my opinion, the blend of backgrounds that is acquired through experience in each of those fields is invaluable.

The educational background of the solid industrial economist is extremely important. The school years are the years when the mental batteries are charged. As an undergraduate, our potential decision maker should sign up for a major in economics, supplemented by a good dose of mathematics and statistics. Along the way, he ought to get as much speech training as possible, and I would suggest that he take a minor in journalism. He won't be effective in his occupation if he lacks the ability to tell his story convincingly.

Even though he earns a bachelor's degree, and the diploma is put in its frame and placed on the wall, our embryo industrial economist has more studying to do. He needs graduate work—a master's degree in economics, and preferably a doctorate, although that ultimate achievement is not absolutely essential.

If the full run of graduate study is out of reach for any of a variety of reasons, he can gain valuable substitute experience by serving as an economic assistant in the development of articles and books.

Next to these broad educational requirements, I place teaching experience. The old saying, "You don't really know something until you try to teach it," has a real bite to it. Surely teaching is the best single method of gaining a solid grasp of the fundamentals of economics. Furthermore, teaching is one of the finest available proving grounds for polishing up public speaking—an asset which is extremely important to the success of the industrial economist. The captive audience of students in the college classroom has played an important part in the gestation period of many a successful orator.

When it comes to acquiring a work background, the economist may turn to four areas as he prepares himself for an industrial position.

The first is in the government. In government economic work, a man may gain a broad perspective of some of the practical working of the whole economy of the nation.

Second, great experience opportunities exist in trade associations. As in a government position, the economist in a trade association gains an understanding of the broad picture—this time for a particular industry or trade area. He develops skill in balancing and weighing the pros and cons of diverse viewpoints.

Within the economic research group is found the third great area for practical work experience. Here the prospective industrial economist acquires training in the methodology of economic research—techniques which are going to be essential to him in industry.

And fourth, of course, he can turn to individual business firms for

broadening and beneficial experience. He learns to meet the requirements of his management for economic information, and to weigh the problems of the firm and offer solutions. In this area, while the opportunities are wide and diversified, the patterns of study within an individual business or trade will tend to be within narrower lines.

But this, of course, is the goal of the industrial economist. To be hard-headed about it, he probably should not be too much interested in a job with a firm that has assets of less than a million dollars. His chances of success are better with a bigger company. A firm of smaller size, we must admit quite frankly, usually just isn't able to absorb the special talents of the economist in such a way that his addition to the profits of the business will justify having him around the office.

Duties of the Industrial Economist

And what does our fully qualified industrial economist do when he finally lands his job with the million dollar corporation? Well, the 1953 Handbook of the American Economic Association describes the profession this way:

"The economist specializing in industry studies forms of business organizations, with arrangements for the production and marketing of goods and services and thus studies cost and prices, private investment policies, wholesale or retail trade, business trends, regulation by government of industrial monopoly and industry generally. The economist may specialize in one or more specific industries, either non-manufacturing, such as forestry, or construction; or manufacturing, such as food, textiles, lumber, paper, iron, steel, petroleum or rubber.

"In the transportation and public utilities industries he studies rates, valuations, traffic or use of service, and materials as they affect railways; aviation; water transportation; electric power and gas; highway, bus and truck transportation; radio and radio broadcasting; and wire communications. He also studies the effects of government regulation, consolidations and monopoly, ownership and operation in these industries.

"Economists in this field attempt to explain why the national output of goods and services is subject to fluctuations, and to recommend measures for assuring a higher and more stable level of output and employment. They investigate the influence of private investment (production of new plant and equipment), of government spending and taxing, of monopolies, and of wage policies, upon the level of employment. As a guide to future policy, they make estimates of the size of the national output which our country is capable of producing."

Briefly, the objective of the training and work experience of the industrial economist should be to produce a keen understanding of both the

practical and theoretical aspects of the functioning of our economy and industry. With proper background and experience, the qualified economist has both the knowledge and the judgment of what business policies should be.

To be more specific, I think a comprehensive list of the opportunities available to an economist in industry can be organized under a few major headings.

First, his management needs forecasts of general business conditions, both short and long term. The economist builds this broad platform of understanding as a steady responsibility.

Second, upon the general business platform, the economist must build forecasts of the outlook within his own industry—both for the short and for the long pull.

Third, he assists the purchasing department through analysis of probable trends in material and component prices. And he supports the planning of the Sales Department with studies measuring market potentials regionally and nationally.

Fourth, he aids the treasurer's office by analyzing trends in money supply and interest rates.

And finally, he is of great value to the pricing department when he produces data essential to the development of the proper price structure for the company's product line.

Now, those five areas seem to me to be the important opportunities for the industrial economist. And if he looks at his opportunities with self-interest in mind, what should he do to make the most of them? Well, in my judgment, there are five essential keys to getting better acceptance mileage out of this reasoning and facts.

Making the Most of Opportunities

He must get things done. He is working for a money-making organization, and he can justify his position only if he strengthens the company's earning power by developing information that actually can be used to advantage by his management. There's no room for frills or side issues.

He must recognize what is important, and get that part of the job done first. He must sense what deserves priority, and operate with a built-in set of urgency ratings that cover the span of his firm's operations.

He must observe deadlines. Nothing in business is quite so useless as a beautiful chart and graph presentation proving that last month's decision was right. The evidence must be in before the decision is made.

I said a while ago that the industrial economist finds his best opportunities in business of million dollar dimensions or bigger. Well, in that level of business, there's very little spare time. It behooves the economist to

consider the attention factor—to keep his conclusions simple, and to talk plain language.

Finally, he must make strong recommendations. To borrow a slang expression, in business, it's a case of "Put up or shut up." The economist presents facts and recommendations on which major firm decisions must be made. He must be as forthright in his recommendations as he expects his management to be in acting upon them. There's little room for weasel-wording.

All five of these elements—getting things done, understanding priorities of action, doing things on time, keeping conclusions simple, and making positive recommendations—are interwoven like strands of spaghetti on an Italian blue plate special. All of them direct the economist toward his goal, which is to help management make decisions or take action which will sell more products and enhance the profit position of his company.

Certainly, there is nothing new to the challenge of getting things done on time. But to the economist, this means approaching problems with new vigor and vitality, so that the results roll out on a daily basis and his management is constantly informed and advised.

It also is not big news to say that the important things must be done first. However, I have noticed a strong tendency among some economists to work on the "little" things—to play around with the jobs that seem easy to do. Sometimes it *is* hard to face up to the important problems—the knotty issues. In our operation at Ford Division, we try to maintain a priority list of the problems we are handling. We measure each one against how it will help us to increase sales, or what effect it will have on our earnings. And of course, we are influenced by how important the problem may be to the boss.

So, we get things done on time. In business, a fact that is red hot today may be as cold as a mackerel tomorrow. Decisions must be made daily, and there is no substitute for being ready. When the management rushes in and asks for important facts, you had better be able to reach down in your desk drawer and pull them out. Or better yet, have them on the boss's desk before he gets around to asking for them.

Conclusions must be simple. Nobody in top business management jobs today has time to spare. Conclusions should be kept down to one page, if at all possible. The reaction to a research package three inches thick is likely to be a large yawn. Big reports in business have an alarmingly high obsolescence rate, and they fairly often take a fast trip to the round file at the corner of the desk of a busy executive with a hundred decisions to make.

Mr. L. D. Crusoe, our Division general manager, has a good way of expressing the simplicity that is needed in stating a business problem.

He says that "Nothing is too big or too difficult to be accomplished if we tackle it one piece at a time. If our economy, or any industry or company, ever gets so complicated that it can't be understood, I'm very sure that in short order it will become small again."

I believe that is a challenge to the practicing industrial economist. If he takes his broad job one piece at a time, observes the sensible rules of priority and urgency, and arrives at firm conclusions clearly stated, he makes an essential contribution to the welfare of his company—which, by virtue of its size, may well have a vast influence on the entire economy of the nation.

At Ford, we use charts as the basis of most of our economic data communications system. They are factual hand grenades which we throw at management sessions to get attention, and to drive home our conclusions. To us, and to our management, the problem of communications is important, and we use the very best methods at our disposal to make sure we understand each other.

I think the job of today's industrial economist is truly exciting. Some time ago, Ernest R. Breech, executive vice-president of Ford Motor Company, made a remark about the broad aspects of our job which I think is extremely illuminating. This is what he said:

"Trying to find out just what people want, estimating what they may be able to pay at any given time to satisfy those needs and desires, designing, manufacturing and delivering to millions of people scattered all over the map, persuading them to buy when you are ready to sell—this whole formula is always a great and thrilling contest full of risks and rewarding satisfactions. It is a system which has helped to build a great nation of vigorous, skillful, independent people, and it brings out the best in men."

Surely, when the industrial economist considers his work in the light of that statement, he can take professional pride in the important contribution he makes to the prosperity and welfare of the nation.

DISCUSSION

LOWELL S. HARDIN
Purdue University

In the preceding, effectively presented papers we have been told that the industrial economist should: analyze, digest, present clearly, speak fluently, act decisively, and move with a "deft sense of timing."

To what ends does he do these things? According to Eggert, to *forecast:*

(1) business conditions, industry outlook;
(2) probable factor (materials, money) and product prices;
(3) volume of product sales at projected schedules of prices.

These are the important traditional duties. But let us examine briefly certain current developments on the industrial and academic scenes, then ask ourselves if these create further opportunities for the industrial economist. Among these developments we might list: increased substitution of capital for labor; a current shift in emphasis from "production at any cost" to real cost consciousness in a cost-price squeeze; and important developments in production economics and in "operations" research.

These and related developments suggest that in addition to price forecasting and market analysis, the industrial economist may increasingly be called upon for work in: resource allocation, "operations" research and evaluation of technological developments and innovation. This may mean that industrial economists, as a group or more likely as members of a team or task force, will:

(1) define alternative courses of action, even to the extent of creating previously undefined alternatives and

(2) evaluate the consequences of following each alternative.

This of course requires predictive ability of a high order. But increasingly our analytical tools are being sharpened to the point that this is frequently possible. The decision making function is left to management, but it is the industrial economist's challenge to equip management so that decisions can be made with as nearly perfect knowledge as possible.

If we accept this framework, then the training requirements become more specific. Among these requirements we might list: undergraduate training in subject matter areas such as engineering or agriculture as well as in economics; firm graduate student training base in both macro and micro theory with real understanding of modern production and distribution or consumption economics. Thus knowledge of mathematics and statistics are required; actual experience in applied as well as theoretical problem solving, at least on paper with one or more theses or their equivalent is desirable.

This suggests that government work may be overly specialized, not broadening. It recognizes trade association experience as often being promotional rather than analytical in character. And it further suggests that good educators should take a dim view of the use of classroom teaching experience with "captive audiences" as an experimental interlude in the training of industrial economists.

As an outsider peering into the development needs and opportunities for industrial economists, the potential growth appears large. We have found that the demand for professional farm managers and consultants goes up when some of the farm businesses become financially sick and when the rate of technological changes is rapid. Once employed, professional managers are retained as their contribution to increased productivity and savings is recognized. Industrial economists should enjoy a similar experience.

As educators, we can contribute to the technical and analytical competence of our students. Guided experience in problem solving with increased emphasis on the case method pays real dividends. More powerful tools of analysis are at hand. In theory, this power can be harnessed and used by modern industry if we have the vision and imagination to put it to work.

PROBLEMS OF THE ECONOMIST WORKING WITH ORGANIZATIONS

LLOYD C. HALVORSON
The National Grange

THE job of a farm organization economist is a very interesting and satisfying one because of its close contact with the final stages of agricultural policy formation in both farm organizations and Congress. However, any agricultural economist has a good chance of affecting agricultural policy formation. A good idea, no matter where it is developed, sooner or later is recognized by agricultural statesmen.

I urge my fellow economists to work closely with the farm leaders in their respective states. This not only will bring about more economic understanding in the ranks of farm leaders, but even more important, agricultural economists will have a better understanding of farm problems and farm thinking. There is no reason why there should ever be antagonism between college economists and farm leaders in any state, provided both understand and respect each other's role.

The job of a farm organization economist can be divided into two phases: First, there is policy formation, and secondly, there is policy implementation or execution. I was not hired to influence Grange policy in the direct sense, but I was hired partly to provide facts, economic analysis, and economic reasoning that would help our Grange leaders to determine sound policy.

Policy formation goes on every day in a farm organization in two ways. In the first place, the members think daily about farm policy. Whenever they hear or read something it may affect the policy decisions that will be made at the annual sessions. Secondly, farm organization policies are necessarily so broad that the Executive Committee, or board, and the head of the organization must make a number of the policy determinations.

In the beginning my work on policy implementation was largely auxiliary to the Master of the Grange and to the Legislative Counsel. As time went on, I took more and more primary responsibility for the presentation of Grange testimony, and for the lobbying to secure its acceptance. Implementation of Grange policy means mostly that we seek Congressional acceptance of our policies, but it also involves acceptance of our policies by the administrative agencies of the Government. In a still broader sense, policy implementation involves the gaining of public acceptance. An economist for a farm organization has to work closely with the public relations or information division of his organization.

Role of Farm Organization Economist

So much for the role of a farm organization economist in the broad sense. I presume that this group would like to know the nature and the scope of the problems with which a farm organization economist must deal. Such a discussion might have a bearing on the curriculum of colleges.

The legislative interests of the Grange are very extensive, because everything that affects the farm family is a pertinent subject for resolutions. Below is a list of topics with which I have had to deal in some detail this year:

1. Agricultural policy
2. Transportation policy
3. Social Security
4. Federal aid for roads
5. Taxation and budget
6. Fair trade laws and anti-trust
7. Flood control and reclamation
8. Health
9. Advertising of alcoholic beverages
10. Federal aid for education
11. Foreign trade
12. Farm credit

Actually, the number of topics I must deal with to some degree is much greater than this, and each of the topics listed above can be broken down into a number of subtopics. Each of these topics is dealt with from both the policy implementation and policy formation side. It is evident that in order to be able to bring together, or have in mind, information on the basic legislation, basic theory, the current situation and the current issues of all these topics, a person has to operate in a different manner than economists in colleges or in private industry.

Later I want to deal with a few of the topics listed above, to give some insight as to the nature of the problems with which I must deal. Also, I believe that I see the problems slightly different from my position than economists in colleges, business, or government would see them.

On the policy formation side, my work is naturally with the members and officers of the National Grange. During the year I receive many requests for information from Subordinate, Pomona, State and National Grange officers. They can deal with everything from the price of butter in New Zealand to parity prices for green beans. In the past year our members have had considerable interest in foreign trade and tariffs. Sometimes they want information on such matters as the Federal Hos-

pital Construction program; sometimes they inquire about bills that are before the Congress.

I do not always wait for Grange members to request information. When I find some literature or data which I believe to be highly significant, I will mail it out to our State Grange officers. Sometimes I prepare articles for our *National Grange Monthly,* and I may work with our public relations man and supply him with information. Furnishing Grange leaders with literature can be easily overdone. Also, a person must recognize that oftentimes economic literature is too technical for noneconomists. Another department of the Grange publishes the *Washington Farm Reporter,* covering current legislation and commodity developments, so I mostly watch for basic research findings, or facts beneath the surface.

The National Master of the Grange is in a policy leadership position, as well as in a policy implementation position. I supply the National Master with the information he requests, and also such other information that I believe to be pertinent to current problems and of use to him.

So far, I have talked as if my job on the policy formation side involves only the supplying of information, but it goes considerably beyond that, and that is where the pitfalls exist. Sometimes a farm organization economist must interpret data and that, at certain points, leaves room for argument. When facts are not clear, one must deal with beliefs. Next, there is the step of drawing conclusions from facts. Here there is room for considerable difference of opinion, but here also is where some of the benefit or worth of a farm organization having an economist lies.

Argument presents a problem in human relationship. It is one thing to argue with a fellow economist—and even then feelings get hurt—but it is an entirely different matter to argue with your employer and the officers, delegates, and members of your organization. In general, it is well to have an employer who wants your advice or argument, even if he does not agree! When I was interviewed for my present position, I purposely started an argument on a matter where I knew my prospective employer would disagree with me, but he hired me anyhow. He was more concerned with getting new ideas and viewpoints than with my conclusions.

I have learned that many things besides economics go into the making of conclusions. That is one big difference between a farm organization economist and a farm leader. It helps considerably to let the people for whom you work know that you realize that they know more than you in general, and that you are only giving them facts and economic logic for such use as they desire to make of it. A farm organization economist should try to avoid frontal disagreements with the ideas or arguments of this organization's leaders or members. I am talking about within the

organization. A farm organization economist will destroy objective receptiveness if his argument makes face saving necessary for somebody. Not only that, but a prejudice might be built up against most everything he does or says. Of course, a farm organization economist cannot attack or disagree publicly with his organization's point of view. At the same time, he should not agree to, nor should he be expected to, use or endorse arguments in support of his organization's policies which he considers unsound.

Stick to Central Issues

A farm organization economist loses his ability to establish a clear position of truth and economic logic if he pursues every distinctly unsound, but often imponderable and sometimes irrelevant, argument used by one or more policy makers within his organization. It is better to keep emphasizing the main fabric of your economic truth and argument than to take excursions down every avenue that someone opens up. If you do, the result is probably complete confusion. Sometimes it is better to use only one or two facts, or clean-cut lines of logic clearly established, than a book of facts in which the main truth is lost.

A farm organization economist must be completely impersonal in his arguments and unemotional. If there are factions within the organization, he must not take sides. He should deal honestly, fairly, and openly with both sides. Both parties involved in an issue should feel free to call upon him for facts and economic logic.

It is my feeling, that on some controversial matters a farm organization economist can gain acceptance of economic logic best by avoiding discussion or argument with everyone but the head of the organization. There must be such mutual respect and trust between the farm economist and his chief, that he need have no qualms about saying whatever he has on his mind. I believe that a person, who has complete intellectual honesty and integrity, will find that his employer will listen calmly and objectively to most anything he wants to say.

This has another advantage for a young economist. When I started working for the Grange nine years ago, I had read about only a few of the economic, social, and political issues on which the Grange evolves resolutions. I revealed my ignorance in private, and I learned the many norms and values beyond economics which govern conclusions and selection of means.

A farm organization economist must come to recognize that economic reasoning is only one of a number of factors that govern conclusions and choice of means. He should feel quite satisfied if he has brought about economic understanding, even if the organization's policy is not

what economics alone would indicate. Persistence and insistence are virtues for a farm organization economist only up to a point and in a certain way.

When a Grange leader said to me, after five years of rather periodic argument, "You have made a free trader out of me," I felt quite pleased, even though he added he was not for abolishing our tariffs under existing conditions.

The leader of a farm organization seeks economic advice and critical economic analysis, but he wants it in a respectable way, without obnoxious persistence. It should not hurt the feelings of the farm organization economist, if his advice is not taken. When the advice is taken, the leader of the farm organization can establish acceptance of it many, many times faster than the economist himself. The farm leader has the confidence of the members, but more especially he can cast the reasoning in such a way as to fit in with the belief, norms, and values of the members.

Another phase of the work of a farm organization economist is the evolvement of solutions to problems. Here is where he can most quickly and most completely find himself out on a limb. I know of instances where a college professor's idea has been accepted by a farm organization, and some have not been that fortunate. If a farm organization economist spends considerable time developing an idea and it is rejected and criticized, he starts to feel out of place. However, with the right understanding in an organization, every new idea or plan should be recognized as progress, even if it cannot be accepted. Even farm leaders learn that some things they propose are not accepted.

Sometimes the most perplexing and exasperating policy problems of a farm organization economist are persons who have devised a plausible theory that ties in perfectly with the prejudices and wishful thinking of farm people. They have statistics to prove their point and they have answers to every argument that you raise. They are skilled at casting doubt and suspicion. For several years I had my hands full with the "seven to one theory." At the National Grange Session in California there were at least four monetary "experts," and one in particular could make money and banking seem very simple and the solution to everything. Sometimes my rebuttal has to be so complex that the Grange members do not understand what I say. I have had to forget about theory and find defects or points of weakness which non-economists can understand. It is better to keep yourself in a position where you ask the questions, than to get in a position where you answer questions: generally a question is quite often better than an assertion.

This past year two men presented my employer with such intriguing

theories that I could not expose their unsoundness fully enough. They were very intelligent and successful people who command confidence and respect. I arranged a dinner for them at a hotel and invited the top experts from the Government agencies and private business to be with us. After the dinner we had a seminar on the subject with the head of my organization presiding. Even then it was sometimes difficult to refute unsound arguments in terms convincing to non-economists.

The annual session of the farm organization is the high point in policy formation. If an economist operates in a friendly, tolerant way, with persistence only to the point of being understood, he can present all the economic arguments he can think of without fear of becoming unpopular. However, to operate in a condescending way and to try to impose your views, or to taunt those who disagree with you, or even to feel hurt if you get a few taunts yourself, is to lessen your worth to the organization. The head of a farm organization should never tie the economist's hands at the annual session, or expect him to push through his ideas. My employer has always let me be a free agent.

When the annual session is over, the farm organization economist must accept the policy adopted and apply all his talents to the implementation of it.

As a final word on the policy formation side, I want to emphasize that a farm organization does not hire an economist to make policy decisions for them, nor to influence policy in the direct sense. They hire him to provide information and economic logic for what use they want to make of it. A farm organization economist, who thinks he is supposed to make policy decisions and push them through, is soon "through."

The main reason a farm organization hires an economist is for policy implementation. I should also point out that a farm organization does not hire an economist to be solely an economist. My title is "economist," but much of my work is legislative and lobbying. I am prejudiced of course, but I believe economic training is better training than legal training or any other training for farm legislative work. However, if a young man in college knew beforehand that he would be working for a farm organization later on, he would design for himself a curriculum quite different from any "packaged" curriculum available or generally recommended. Law, history, and political science would need to be included to some degree.

At the outset of my paper I listed the subjects which I have had to deal with in some detail this past year. When the National Master or the Legislative Counsel presents the Grange testimony, my job may be to simply review the testimony from not only the economic angle but from every angle. Maybe something can be said in clearer language.

Maybe some point is not clear, maybe a point can be added. Oftentimes I am asked to supply certain figures, or prepare tables of supporting data. Occasionally I prepare charts, or secure the right one from the U.S.D.A. At times I suggest tables of certain kinds to support arguments.

Other times I have to help develop ideas and make calculations. When I first started with the Grange, the Grange Master had been talking about modernized parity. He had a rather clear concept of what he wanted, but he was not as familiar as I with the way indexes are constructed, and what a person could and could not do with them. I set down the formula for modernized parity, and made the necessary calculations to determine the modernized parity price for the major farm commodities.

Congressional Testimony

I have never worked up detailed statistical appendices for agricultural testimony. If the Senators or Congressmen have time to attend the hearings, and listen to the main part of the testimony, it is all that can be hoped for. I do go up to the hearing with the Grange witness, and I am armed with the main statistical publications, in case a question should be asked involving a statistic.

Sometimes the Grange puts on a main witness, and I am also put on as a supporting witness. For example, on reciprocal trade, the head of my organization once discussed the main current problems and situations in world trade, and I presented the theoretical brief in support of the conclusions. Usually Congressional Committees are in such a hurry, that they will schedule only one witness from an organization, unless the organization is split on the main issue.

I have been given more and more primary responsibility for presenting Grange testimony in some fields. I have learned that good testimony consists of bringing out several strong points in a poignant manner, rather than presenting an exhaustive and comprehensive statement, as I was first inclined to do. In other words, it is more important to say a few things in such voice and such words, and in such a setting that it makes a lasting impression, than to bring out every possible argument. A person can cancel out his effectiveness quickly if he sounds insincere. Usually, the news reporters give a person a good idea of what he has said effectively.

Being before a Congressional Committee is an exacting experience. A farm organization economist can often anticipate questions and be prepared. Knowing that I may not have the answer to every question, or that it may take time to think of it, I usually equip myself with something like a general answer on the subject, or I will say "on the other

hand," and re-emphasize my own strong points. It is but seldom that I have to resort to such a defense. However, at times the best thing to do is to admit you do not know the answer.

In the preparation of testimony for Congressional committees, it is well to make a clear and simplified statement of the problem. It helps the news reporters and the organization's members, who read it. Also, it helps the legislators. In developing arguments to back up the organization's policy a person has to be resourceful. He has to be continually on the watch for relevant facts, or arguments. He has to picture the situation and what the effects will be with or without the legislation. I try to get in touch by phone or letter with most everyone who knows something about the subject, even with those who disagree. In fact, a person has to know the main arguments on the other side to be effective, but a testimony that is mostly rebutted is seldom very good.

Formal appearance before administrative agencies is quite a different experience from appearances before Congressional committees. There are more rules to follow, and the witness has to take the oath. Secondly, there is cross examination by expert lawyers, who have specialized in the field. In a recent I.C.C. case, I not only was a witness, but I did some cross examination also. Not having had such an experience, or having any legal background, I did not know the rules for direct testimony, cross examination, and redirect testimony. I did not know what was meant by a leading question, and when it could and could not be asked. I personally do not like the rules followed by administrative agencies, because they tend to prevent the whole truth from coming out. I believe the Congressional committee procedure is better.

A person who appears before Congressional and administrative bodies to achieve the policy objectives of his organization, is designated as a "witness." To me "witness" means a person who has seen something happen. This is all right for criminal cases and to some extent for Congressional and administrative bodies, but usually a "witness" is more concerned with broad social and economic consequences or implications of proposed legislation or administrative actions, than with any past situation or event. In the recent I.C.C. hearing on trip leasing, a witness was supposed to deal only with facts of which he had personal knowledge. This was a nice arrangement for the Teamsters Union, which brought in witnesses to confess all the crimes, horrors and abuses they committed under trip leasing, but we in agriculture were more concerned with the economic consequences of a ban on, or restriction of, trip leasing. We were also concerned with the question, whether the method proposed was the best method to achieve the desired end; and even if

the alleged abuses were true, whether matters of a little extra safety and stability justified the repercussions on agriculture of the proposed restrictions on trip leasing.

In other words, one problem of a farm organization economist is that he finds himself at times operating under legal procedures in which he has had no formal training and which procedures seem ill suited to social phenomena and social determination. I should add that the I.C.C. examiner did not adhere very closely to his rules. I learned that if a person could qualify as an "expert witness," he could give opinion-testimony, so I set myself up as an expert and proceeded to say exactly what I thought the consequences of the I.C.C. order would be. The examiner accepted my testimony for the record, but I do not know how much consideration he will give it.

At times, policy implementation involves a kind of lobby work on the Federal agencies. Recently one of our state leaders wanted a Federal milk order for his area. I had to argue with certain officials of the U.S.D.A. to help get it through. I had only a general knowledge of milk orders, so I began by asking why this particular area could not have a milk order, and I then tried to overcome each argument. Quite frequently there are problems to work out with the Internal Revenue Service. Sometimes producers of honey, for instance, or rabbit fur, want us to help get a support program for them. Price ceilings always result in demands for adjustments.

Work Load Must be Organized

There is one problem that involves my whole job. There is no end to the amount of work I could do. Many letters and resolutions come in from the Grange leaders, rank and file members, and even consumers. We get publications from numerous research organizations, asking us to review their publications and comment thereon. Furthermore, new requests or assignments do not wait for you to finish what you are already doing. You keep up, or the work piles up and the latter is bad. You start to feel uneasy and dissatisfied and furthermore the people you work for do not like it. I must say my employer has been very considerate, but still I have had to learn to work faster than I ever thought I could.

A farm organization economist has to learn to distinguish between what is urgent and what is not. He learns that poor service on requests from the organization's leaders lessens his usefulness, and hurts his standing. He learns that what the organization's leaders think to be important is a better guide to what is important and should receive the most time, than his own leanings.

A farm organization economist must learn to adjust to the demands of his job. At first I prepared long, detailed and exhaustive replies to my employer's requests for information and to incoming letters. I soon learned that I did not have much, if any, time for reference reading. I had to learn to dictate on a dictaphone well enough that the secretary would turn out a finished product, at least on inter-office memos and the simple letters.

Some farm organizations have commodity economists as well as a general economist. Some have the women's organization handle health and welfare legislation and developments. My job is also that of a sociologist to some extent, and I regret that I have never had a course in sociology.

I have become an expert, I believe, at doing research work via the telephone, and I have learned quite well whom to call for what. The people in the Government cooperate wonderfully. I keep only a small library and a limited number of files, since I could not begin to build an adequate library, and it would be costly to have a librarian and also to use such a big space.

If I had to go to a library and find for myself the information I need, I could not do a fourth of what I am doing now. Usually there is an expert on every subject somewhere in Government or in private agencies, and he has the desired information at his fingertips, or he can tell me where to get what I want. However, there are times that I cannot find the information desired.

There is a fine line between what I can and cannot ask a Government agency to do for me. Asking for information is one thing, but asking an agency to compile data and even make calculations is quite another. At times, we in the Grange have asked for tables involving special calculations, but not generally. Some letters which we receive can best be answered by a U.S.D.A. agency, so we send the letter over there for reply. The recent changes in agency names, which now include the word "service" have made me a little bolder in asking for assistance. I believe people generally like the word "service" in agency titles.

There are a few problems involved in relationship with the Government people. I learned early that if I make a request involving a considerable amount of work, it is best to ask a person at a level high enough so he can assign it to someone else. This is natural, because each employee has assigned work to do and he feels better, of course, if he is working on direct assignments rather than on outside assignments.

When I first started my job and began making telephone calls to get information from Government agencies on subjects on which I was very green, I became rather angry with people who seemed to want to frus-

trate my requests. Actually, in most cases it was my own fault. I was asking for something specific that did not quite exist, or I was too general. I have learned since that it is wise to explain to the person on the other end of the telephone just what I want the information for, and ask him to suggest the best possible data or information available. In this way I do not only obtain the information I need, but I also borrow their intelligence in a way.

At times, this has completely changed my approach on a problem. It is also more enlightening and interesting to the Government employee.

Each year at the Annual Session I am expected to have the answer to most any question that is asked. At one time I took along two suitcases of reference matter, and still I was caught short. Also, much of what I had with me was not needed. I now write the chairman of each session committee and ask him to let me know just what information he wants me to bring along. Also, I know quite well by now whom to call or wire for information. Once, when I did not have the answer to an involved question on the Federal Crop Insurance Corporation, I wired the U.S.D.A. and had the answer the next day by air mail.

Not only do *I* call upon U.S.D.A. agencies for help, but in a way *they* too call upon my organization for help. Most Government agencies now call meetings with farm organizations before they announce important new programs, or make changes in existing ones. We watch appropriation requests and add our support to secure the money for worthwhile projects.

I frequently am asked to attend meetings in Washington or elsewhere, where economic policy, rural health, social security, foreign trade, and other subjects are discussed. Sometimes I am convinced that the Grange should support the proposed policies or legislation. I do, of course, pass on my ideas and convictions to the head of my organization, but that is not enough, because the Session Committees go into considerable detail. At one time I came close to becoming an advocate or lobbyist within the Grange for the new ideas I had gained at meetings which I attended as the Grange representative. Sometimes an economist can use his influence to have an officer or leader of his organization also attend such meetings. Such a person is in a much better position than the economist to advance these ideas to the other delegates and officers, and to argue for them.

Philosophical Approach

This paper would not be complete without some discussion of the major economic problems and the frame of reference in which they are cast for a farm organization economist. When I first came out of college,

I was quite inclined to think that if Government would simply leave alone the economic problems of an industry, the free market would bring about satisfactory income distribution and also resource adjustment. If there are adverse economic trends in an industry, I am now inclined to believe that the industry will suffer long-run income disparity and even poverty, unless there is some Government program to improve the situation. Some economists are quite inclined to presume that the mobility of resources postulated in economic theory, and recognized as a necessity to equity in income distribution, exists in our economy in this day and age.

There are also some economists, it seems to me, who recognize that mobility does not exist but who believe that it is nevertheless robbery for the Government to ever adjust the economic machine so as to give people in a depressed sector, as agriculture, an income closer to equal pay for equal work. They think it is just so much hard luck for those who find themselves in a depressed sector. I am not here to defend the specific programs used to raise farm income, but I do believe that if an economist fails to recognize that people can properly be as concerned with income distribution as with maximization of national income, he will be of limited value to his organization. A farm organization economist must recognize that farm people and other people have decided that they are quite willing to interfere with the free market in order to bring about a desired income distribution. I do not think there is anything sacred about the income distribution of a "free" market, if it really is not free, and if there is not as much mobility of people as theorists sometimes use for their assumptions.

As farm people in this age of rapid communication and transportation become more aware of the amenities of the modern level of living, as they associate more with people who enjoy them, and as they get a taste of it themselves, they will be less inclined than ever to sit back and philosophically accept a drop in their already low income.

This does not mean that a farm organization economist should throw up his hands and go home. It does mean, however, that a person in my position cannot advocate the bankruptcy route or the "squeeze 'em out" theory of resource adjustment. It never did work very well anyhow and may actually have worked in reverse. If farm people cannot educate their children properly, rural youth will have less chance of getting jobs in the expanding sectors of our economy. A poverty stricken area degenerates in health, outlook, and culture. Some may be too poor to even go into other areas to look for a job. Low income may also make it impossible for farm people to increase their efficiency by buying new and better machinery.

As a farm organization economist I am extremely conscious of the financial trauma and the financial scars that would be put upon American farm homes if we should today go the bankruptcy-and-"squeeze 'em out"-route of resource adjustment in agriculture. This is a cost that cannot be ignored, for it is even more important than dollars.

This boils down to the fact that one problem of a farm organization economist, and all economists for that matter, is to devise workable and acceptable means of resource adjustment with a minimum of income disparity. Rather flexible prices are quite satisfactory where the farmers can shift to alternative enterprise. Some income disparity is needed at all times to help induce shifts, but as indicated above, too much disparity may bring the reverse effect.

Grange leaders were among the first to start advocating large new appropriations for marketing and utilization research by the (then called) B.A.E. and other U.S.D.A. agencies, that led to the Research and Marketing Act of 1946. We have also advocated increased efforts to expand the consumption of our farm products at home and abroad. Even after all this, there are probably too many resources in agriculture for some years to come.

A number of things can be done to bring about resource adjustment with a minimum of price and income disparity, but I do not have the time to discuss that subject here. The parity concept needs further thought and possible revision. At one time I worked out a complete new parity concept, based on income parity, but it was not accepted.

Here I cannot discuss all the subject matter problems that I deal with during the year. I wish it would be possible for more economists to be near the scene of action, for I believe the American economists could make an even greater contribution to public policy than they have done in the past.

There are other problems of a farm organization economist which time does not permit me to discuss. I want to mention, however, that a farm organization economist faces some personal-professional problems different from those of economists employed elsewhere.

Summary

In summary, I will compare the job of a farm organization economist with that of a college professor. First of all, there is a more delicate problem of relationship with the people you work for. Secondly, you do not have a captive audience. You have no safeguards for academic freedom, but still you need to lay out for consideration frank and honest economic analysis. You need to learn and understand the norms, values, and objectives of farm people. You have to be able to give expert advice

to your own organization, to Congress, and to Government agencies on subjects you studied, but are not qualified to teach. You cannot use theoretical economic models of others, but you can use parts of them to build a new working model that conforms to the real situation as you see it, and is suitable and satisfactory to the people you work for. You cannot use the notes of previous years, but there are new and different problems every day, that do not have the clear-cut solutions of theoretical problems. In making a point, saying it effectively may be more important than technical accuracy. College professors help devise economic tools, and impart them, but farm organization economists must apply them to all kinds of problems continually changing.

As a final word, I want to say that the job of being a farm organization economist is an exacting one, but an interesting one. It is full of challenges and opportunity. Formal economic training is of course basic, but some other training would also be helpful, as in law, history, political science, journalism and speech.

DISCUSSION

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Mr. Halvorson has given us a very interesting and, in my judgment, a decidedly valuable report of his experiences, observations and conclusions as an economist employed by the National Grange. I would like to submit brief discussion of this paper along lines indicated by the title given to this section of our program, namely, "Opportunities, Problems, and Needed Training of Agricultural Economists Working With Industry". The fact that Halvorson has not attempted to discuss the subject of "opportunities" as such, nor the subject of "problems and training" beyond his personal experience in the Grange does not mean that we cannot take much from this paper on all these subjects by implication, indirection, suggestion, or example.

On the subject of "opportunities", certainly Halvorson's case may be taken as an illustration of how a person trained in agricultural economics can develop the job, and how the job to be done gives measurement to both economics and the economist. We are led to suspect that some and perhaps much of the work that an economist is likely to do when working for organizations does not come with an advance notice or understanding of a detailed job description, and that many opportunities, as well as problems are probably unforeseen. I also suspect that if we attempt to list the farm organizations which now have or have had an agricultural economist as such on their payroll, that their number would be small, and if we would try and list our own estimate of farm organizations which need an economist for the type of work done by Halvorson, that their number would be even smaller. This is not saying that the potential job opportunities for agricultural economists with farmer organizations are limited to such small numbers; it is simply an attempt to appraise, even roughly, a field of activity.

The subject of "opportunities" takes on broader aspects when we think of

agricultural economists working with, as well as for, farm organizations and for organizations of many kinds. For those of us who are on jobs in our Federal-State extension service, in publicly or privately financed research projects, in high school, college and university teaching, in government and college administrative work, in research foundations, in banks for cooperatives, and in other similar services, there is both the opportunity and the need of working *with* organized groups as distinguished from being on the payroll of any particular group. Then too, there is that group of men and perhaps women who hold positions in industry because of their training and performance in agricultural economics, but who are without the title of "economist" on their jobs. Undoubtedly there are many more opportunities than we suspect in working both for and with organizations and industry, and we might even ask to what extent farm organizations have any interest or need of hiring an economist to work for them when they can obtain services of economists from someone else's payroll. In this broader sense, much more can and needs to be said than is found in Halvorson's paper, or than can be said by a discussant at this time.

Considering the wide variety of work done by Halvorson as a titled economist, much of it outside of economies, and that this is a condition in a major farm organization, we have cause to wonder whether there can be very many or any opportunities in industry for an agricultural economist who limits himself strictly to agricultural economics, especially if he should have a narrow concept of economics. This brings us to Halvorson's comments on problems and on needed training.

Perhaps for a brief discussion of this paper we can regard the subject of "needed training" as being so closely related to the subject of "problems" that we may consider them together. It seems to me that Halvorson's comments on his problems as an economist working for a farm organization have their origin essentially in the problems of the Grange; in this sense the problems are indeed numerous and of great variety. On the subject of "needed training" Halvorson does not say that training should consist of this and that, but rather, by example and from personal experience he gives us an insight into a job carrying the title of "economist" and appraises his own needs. A few abstracts from his paper, although taken somewhat at random and out of context, illustrate how this paper bears upon "problems" and upon "needed training", and this is done without dictating or even urging what others should do on these matters, to quote: "A farm organization does not hire an economist to be solely an economist . . . or to make policy decisions for them, nor to influence policy in the direct sense . . . if a young man in college knew beforehand that he would be working for a farm organization later on, he would design for himself a curriculum quite different from any 'packaged' curriculum available or generally recommended. Law, history and political science would need to be included in some degree . . . I regret that I have never had a course in sociology . . . as to money and banking, I feel fortunate in having good training in this field . . . I was thankful that I had a course in public utility economics, but I wished I had taken a course in transportation economics as well . . . A farm organization economist cannot attack or disagree publicly with his organization's point of view. At the same time, he should not agree to, nor be expected to, use or endorse arguments in support of his organization's policies which he considers fallacious. You cannot use theoretical economic models of others, but you can use parts of them . . . There is no end to the amount of work I could do."

In my judgment, some of these sentences from Halvorson's paper contain within them a core of some of the most serious personal problems that any of us encounter as economists and some sentences are not far from what most or all of us could say on our behalf. For example, the endorsement of fallacious policy and when you can or cannot disagree with your employer are points with which all of us come to "grips" at some time or another. There is no doubt in my mind that these matters would afford stimulating discussion in a meeting of agricultural economists, but it is enough at this occasion to acknowledge such problems. More important for present and future discussion are the subjects of training needed in economics and the training needed by an agricultural economist in addition to economics for the purposes of industry, or should we say for the purpose of holding a job as economist in industry. If it is true that these subjects are of considerable importance then each of us cannot help but be stimulated by this paper to examine our own experiences and thoughts on needed training and to direct our influences accordingly. In my own case, this paper and the entire subject of this section of our program suggests an increasing importance to the need and place of theory work in the field of economics of collective action; it suggests likewise something of the need and the problem of integrating the sciences and selecting courses of study.

It was good to hear Halvorson indicate some of his views and convictions on some questions of policy confronting the Grange, regardless of whether we are inclined to agree or to dispute. A few random abstracts will illustrate, to quote: "A farm organization economist must recognize that farm people and other people have decided that they are quite willing to interfere with the free market in order to bring about a desired income distribution . . . a person in my position cannot advocate the bankruptcy route or the 'squeeze 'em out' theory of resource adjustment."

Near the end of his paper Halvorson tells us about being able to give expert advice but not qualified to teach. Without wanting to argue this conviction with him, I think that Halvorson and other economists working in industry and farm organizations could be brought into our agricultural economic classes in college at least once or twice a year with distinct advantage to students, and perhaps, to the teacher and to themselves. I would have appreciated that sort of participation when I was a student, also as a teacher, and more lately as a person working closely with industry.

To conclude this discussion, Halvorson's paper is a thought provoking paper on his subject; it is truly interesting reading and does not offend. Whether it bores deep or slants lightly at bothersome questions and issues, it is not argumentative. It is a paper containing much advice expressed in terms of lessons learned, but we are not asked to take it as such. His experiences are the facts on which he draws or bases his conclusions and observations, and all of this is his personal business which he has submitted to us with an engaging frankness. That our general subject for this meeting deserves future contributions and continued thought is an inevitable conclusion for me.

FOREIGN TRADE

Chairman: George H. Aull, Clemson College

THE USE OF ECONOMIC MODELS IN APPRAISING FOREIGN TRADE POLICIES

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MANY economists think of a "model" as at best a harmless sort of classroom exercise, conceived in abstraction and designed for the edification of the very young. The idea of representing the complexities of real life in terms of a set of equations seems unaesthetic, and the idea of basing policy recommendations upon a "model" seems naive.

To this, I would simply say that some models are realistic and useful for policy purposes and some are not. This depends upon the intent of the model-builder—whether illustrative or empirical—and, if the latter, upon the skill and resourcefulness with which the job is done. Some of our most important economic policies are debated in terms of their estimated (or alleged) quantitative effects. Any selection of alternatives where quantitative aspects are important implies, in my sense of the word, an economic model.

As a rule, I think of an economic model as being developed to answer specific types of policy questions. A useful model must meet certain conditions: (1) It must include all of the relationships and variables which are important enough to affect the quantitative ranking of the alternative policies under consideration, and (2) the coefficients in the relationships must be known accurately enough to give a high degree of probability to the rankings obtained.

In many cases these conditions are fairly easy to meet. Sometimes only a single relationship, or even a single coefficient, is importantly involved. For example, the relative cost to the Treasury of price support through compensatory payments rather than purchase and diversion operations depends in the first instance upon whether the price elasticity of demand for the commodity in question is greater or less than one. Two coefficients, the elasticity of demand and the elasticity of supply, *may* suffice, in some cases, to define the production, consumption and income effects of a change in price support levels. Other problems may require a model of three or more equations. As to accuracy of coefficients, many of these are known within a range of 20 percent or so. The permissible range of error may be much larger than this in a good many practical cases.

Where a decision properly turns on one or two coefficients it is not

necessary to write the model down—it can be manipulated by mental arithmetic. Even here, however, unless one is quite conscious that he is using a "model," there is danger that some important relationships will be overlooked or that some false assumptions will be made—assumptions that could be subjected to empirical and/or logical tests.

In general, it is safer to write the model down. At this point, the model builder may discover that he really doesn't know whether certain variables are important or whether certain coefficients are larger or smaller than the critical values. Unless he can answer these questions from existing technical sources or from new research, he is in no position to give useful advice on the policies at issue. At least, he is in no position to prove that his advice is useful.

The quantitative appraisal of policies, then, requires thorough knowledge of the important economic factors involved; wide acquaintance with research results and with methods of measuring economic relationships; the mental discipline to organize this knowledge into a model logically and institutionally adequate to the question at hand; and the ability to manipulate this model in such a way as to obtain arithmetically correct answers. (The appraisal as a whole may, of course, be a team rather than an individual product.)

My object is to encourage wider use, or at least wider discussion, of economic models in appraising foreign trade policies for farm products. As a rule foreign trade models are apt to be a little more complicated than those relating strictly to domestic problems. Also, the data are less complete and accurate, and complete sets of statistical demand and supply analyses are harder to come by. Finally, foreign trade is more likely than internal trade to be influenced by "arbitrary" changes in rules.

Personally I feel that this last point is overworked as an excuse for avoiding serious quantitative analysis. Any existing pattern of trade interferences can be incorporated into a model, and so can any changes in this pattern. A more basic reason may be a feeling that if all the relevant factors were taken into account the resulting model would be too complicated to manipulate and interpret. This feeling in turn may foster a lackadaisical attitude toward the task of organizing the data and making the measurements which would be needed for a useful policy model.

My own feeling is that the manipulative difficulties have been greatly overestimated. Hence, emphasis is upon the construction and manipulation of foreign trade models. Although some of the models I shall present have been drawn up with specific commodities *in mind*, none of them are based on full-scale empirical investigations. Both the joys and the frustrations of the latter must now be left to colleagues who have better access to research facilities.

Models Involving a Single Commodity and Two Countries

Some problems can be handled fairly well by aggregating all nations other than the United States into a single trading body or "country". We then have a model involving only two "countries." If we are dealing with a single commodity, the basic model will be very simple indeed.

For example, suppose we are given the following information for each of two countries, C_1 and C_2:

Item	*Country 1*	*Country 2*
Demand function	$p_1 = 3.90 - .20q_1$	$p_2 = 4.80 - .25q_2$
Supply "function"	$z_1 = 15$	$z_2 = 10$

Equilibrium conditions:

$q_1 + q_2 = 25$
$z_1 - q_1 = q_2 - z_2$
$p_2 = p_1 + .30$

where p_1 and p_2 are unit prices, q_1 and q_2 are quantities consumed, z_1 and z_2 are quantities produced, and the unit transport cost from C_1 to C_2 is \$.30 per unit. (The demand elasticities are about the same as that for total feed concentrates in the United States.) However, the assumption here is that the commodity is not stored from year to year, and that it is bought and sold in each country under freely competitive conditions.

We can transpose each demand function to place consumption in the dependent position, as follows:

(1) $q_1 = 19.50 - 5p_1$
(2) $q_2 = 19.20 - 4(p_1 + .30)$

As $q_1 + q_2 = 25$, we may add the two equations and solve for p_1 as follows:

(3) $q_1 + q_2 = 25 = 38.70 - 4(.30) - 9p_1$; or $p_1 = 12.50/9 = \$1.389$.

The value of p_1 is the key to all other values of interest in the problem:

$p_2 = p_1 + .30 = \$1.689$;
$q_1 = 19.50 - 5(\$1.389) = 12.55$;
$q_2 = 25 - q_1 = 12.45$;
C_1 exports $= z_1 - q_1 = 15.00 - 12.55 = 2.45$
C_2 imports $= z_2 - q_2 = 10.00 - 12.45 = -2.45$

Given this initial equilibrium solution, we may study the effects upon it of various policy changes. These effects are summarized in Table 1.

Tariff

Suppose Country 2 imposes a tariff of \$0.20 per unit on imports of the

commodity. This means that, in equilibrium, $p_2 = p_1 + .30 + .20 = p_1 + .50$. Formally, the tariff has the same effect in this model as an increase in transport costs.

TABLE 1. EFFECTS OF POLICY CHANGES IN MODELS INVOLVING A SINGLE COMMODITY AND TWO COUNTRIES

Item	Unit	Initial equilibrium	Tariff of $0.20 imposed by Country 2	Export subsidy of $0.20 initiated by Country 1	Price support and export subsidy by Country 1	Effect of $0.20 tariff with price-dependent supply functions	
						Supply elasticities of about 0.2 and 0.3	Supply elasticities of about 0.4 and 0.6
		(1)	(2)	(3)	(4)	(5)	(6)
Country 1							
p_1	Dols.	1.389	1.300	1.478	1.589	1.297	1.295
q_1	Units	12.55	13.00	12.11	11.56	13.02	13.02
z_1	"	15.00	15.00	15.00	15.00	14.82	14.62
e_1	"	2.45	2.00	2.89	3.44	1.80	1.60
Country 2							
p_2	Dols.	1.689	1.800	1.578	1.439	1.797	1.795
q_2	Units	12.45	12.00	12.89	13.44	12.01	12.02
z_2	"	10.00	10.00	10.00	10.00	10.21	10.42
e_2	"	−2.45	−2.00	−2.89	−3.44	−1.80	−1.60
Transport cost	Dols.	0.30	0.30	0.30	0.30	0.30	0.30
Tariff	"	—	0.20	—	—	0.20	0.20
Subsidy	"	—	—	0.20	0.45	—	—

Imposition of the $0.20 tariff raises the price in Country 2 by only $0.111 (Table 1, Column 2). If officials in Country 2 had (naively) expected p_2 to rise by the full amount of the tariff, they would be disappointed by the actual price rise. For the tariff restricts consumption and imports into C_2 and forces C_1 to absorb a larger quantity at home. This causes a fall of $0.089 in the price in C_1.

Export subsidy

Now, suppose we return to the initial equilibrium and assume that Country 1 institutes an export subsidy of $0.20 per unit. We now have $p_2 = p_1 + .30 - .20 = p_1 + .10$. The results are shown in Table 1, Column 3.

Consumers in Country 1 pay the price $p_1 = \$1.478$. But foreign buyers (in C_2) pay $0.20 less than this, or $1.278, at the point of origin in C_1. They must, of course, pay the established freight rate of $0.30 to transport these products to C_2.

Domestic price support combined with an export subsidy

This combination has been applied to some agricultural commodities in a number of countries. However, some industrial concerns have operated nonsubsidized two price systems which are formally similar to the present model.

Assume that C_1 supports the price to its consumers at \$1.589, or \$0.20 higher than in the initial free trade equilibrium. Any part of C_1's production which is not consumed domestically is exported for whatever price it will bring. The results are shown in Table 1, Column 4.

The export price, $p_1(e)$, is $p_2 - .30$, or \$1.139. If the government of C_1 is paying a subsidy equal to the difference between the export price and the support level, this subsidy is $1.589 - 1.139 = \$0.45$ per unit. This model could equally well represent a two price plan without a subsidy.

Price-dependent supply curves

In the examples so far we have assumed that supplies in each country are given or "predetermined." The problem is not significantly complicated if we assume that production is a linear function of price.

Algebraically, the new model may be written as follows:

Country 1

(4) Demand: $q_1 = a_1 + b_1 p_1$
(5) Supply: $z_1 = \alpha_1 + \beta_1 p_1$
(6) Net trade: $s_1 = z_1 - q_1 = (\alpha_1 - a_1) + (\beta_1 - b_1) p_1$

Country 2

(7) Demand: $q_2 = a_2 + b_2 p_2$
(8) Supply: $z_2 = \alpha_2 + \beta_2 p_2$
(9) Net trade: $s_2 = z_2 - q_2 = (\alpha_2 - a_2) + (\beta_2 - b_2)p_2$

The equilibrium conditions are

(10) $s_1 + s_2 = 0$, and
(11) $p_2 = p_1 + d$, where d is the difference between the two prices, made up of transport costs plus tariff (if any) minus subsidy (if any).

If we add the two net trade functions and substitute $p_1 + d$ for p_2, we obtain

$$(12)\quad p_1 = -\frac{[(\alpha_1 - a_1) + (\alpha_2 - a_2) + (\beta_2 - b_2)\ d]}{(\beta_2 - b_2) + (\beta_1 - b_1)}$$

Given specific values of the coefficients of each demand and supply function, p_1 becomes a function only of the difference, d. And from the value of p_1 the equilibrium values of all other variables can be derived. The results of two assumptions as to supply elasticities are shown in Table 1, Columns 5 and 6.

If Country 2 imposes a tariff of \$0.20 on imports, there is a slight decrease in production in C_1 and a slight increase in production in C_2.

Exports are decreased relative to those under the fixed-supply assumption.

If we double the slopes of both supply functions and adjust the constant terms appropriately, the production adjustments in each country are about twice as large as before, as is the shrinkage in exports.

Possible Application of Two Country Models to Wheat, Cotton and Rice

The effective demand for *wheat* for other than feed uses is quite inelastic. A recent unpublished analysis by Kenneth W. Meinken suggests a demand elasticity of between −0.1 and −0.2 for the world as a whole (excluding China and the U.S.S.R). If we assume that the elasticity of demand for wheat in all free world countries other than the U.S. is about −0.2 and that supply is completely inelastic, a decrease of $0.50 per bushel in the price of wheat in all these countries should increase their annual wheat utilization by about 150 million bushels. If the elasticity of demand in these countries is only −0.1, however, the increase in their annual wheat utilization associated with a $0.50 price drop may be only about 75 million bushels. These magnitudes suggest some of the difficulties we face in disposing of our surplus wheat through export channels.

Analyses by Frank Lowenstein and Martin S. Simon suggest a demand elasticity for *cotton* in the United States of about −0.2 to −0.3. An analysis by Robert M. Walsh indicates a supply elasticity in this country of about 0.2 to 0.3.

If we assume demand elasticities of about −0.2 and supply elasticities of about 0.3 in the United States and in the aggregate of all other countries, a reduction of 5 cents a pound in the price of cotton in all countries would have approximately the following effects: (1) Demand would increase about one-third of a million bales in this country and about two-thirds of a million in the rest of the world; (2) supply would decrease about four-fifths of a million bales in this country and an equal amount in other countries. A very modest amount of research effort would yield an empirically based model with which these observations could be checked and various real policy alternatives could be analyzed.

In the case of *rice,* United States production is little more than one percent of the world total. Even if we disregard much of the Asiatic production as noncommercial and assume a rather inelastic commercial demand, it would seem that a price drop of less than 50 cents a hundredweight would increase world rice consumption by an amount equal to or greater than total United States export supplies.

The economic characteristics of these three products impose widely

different limitations upon the effectiveness of programs to increase exports. I believe that these differences can be elucidated clearly and simply in terms of economic models.

Models of a Single Commodity and Several Countries or Groups of Countries

Realistic handling of some problems will require more complex models. In the cases of some international commodities there are perhaps half a dozen major exporting countries and a larger number of significant importers. Usually I would expect that the importing countries could be consolidated (for analytical purposes) into a fairly small number of groups.

On the surface, the problem of manipulating a model containing 10 or more countries may seem quite forbidding. Actually this is not the case. I shall try to demonstrate this in terms of a 10-*region* model of the feed grain economy in the United States, which is formally identical with a 10-*nation* model.[1] Each nation may adopt any of the policies illustrated above (and others as well). We shall investigate the effects on the system as a whole (viewed as a closed system or as a picture of the world economy) of various types of policy changes.

The structure of freight rates between "countries" is shown in Table 2, and the free trade equilibrium pattern resulting from these and the assumed demand and supply curves in each nation is shown in Table 4. The demand functions themselves are given in Table 3. Production in each country in any one year is assumed to be a given constant, but the model would not be appreciably complicated if we assumed price-dependent supply curves. In all cases we assume that none of the commodity is carried over to the succeeding crop year.

Effects of a tariff

Now, suppose that the largest importer, Country 1, imposes a \$0.20 tariff on imports from all other countries. This is equivalent to adding \$0.20 to each one of the transport costs in Column (1) of Table 2.

If the price in Country 1 increased by the full \$0.20 (up to \$1.721), its consumption would be reduced to

(13) $q_1 = 21.4229 - 5.0289\ (1.721) = 12.7682$

This would mean a reduction of 1.01 million units from the previous level of consumption *and* of imports. But Country 1 would still be the

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[1] The original model is based upon freight rates for corn and demand functions for feed concentrates in the United States as of 1949-50. See Karl A. Fox, "A Spatial Equilibrium Model of the Livestock Feed Economy in the United States," *Econometrica*, October, 1953.

largest importer, and apparently it would still draw its supplies from Countries 2 and 3. In fact, in our example, it does not appear that the "arrangement" of sources and destinations will be changed at all—that is, no countries will change from surplus to deficit or self-sufficient status, although this is quite possible in principle.

TABLE 2. ASSUMED TRANSPORT COSTS BETWEEN COUNTRIES

Country	1	2	3	4	5	6	7	8	9	10
	Dollars	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*
1	0	.2156	.3125	.3561[b]	.2175	.3464	.3610[b]	.4292[b]	.5357[b]	.6147[b]
2	.2156	0	.1561	.1405	.1575	.2182	.1454	.2136	.3201	.3991
3	.3125	.1561	0	.1633	.3136[b]	.3707	.3015[b]	.3697[b]	.3138	.3944
4	.3561[b]	.1405	.1633	0	.2980[b]	.3587	.2859[b]	.2638	.2520	.4061
5	.2175	.1575	.3136[b]	.2980[b]	0	.1554	.2433	.3711[b]	.4776[b]	.5566[b]
6	.3464	.2182	.3707	.3587[b]	.1554	0	.1982	.3539	.5389[b]	.6173[b]
7	.3610[b]	.1454	.3015[b]	.2859[b]	.2433	.1982	0	.2190	.4655[b]	.5445[b]
8	.4292[b]	.2136	.3697[b]	.2638	.3711[b]	.3539	.2190	0	.3489	.5054
9	.5357[b]	.3201	.3138	.2520	.4776[b]	.5389[b]	.4655[b]	.3489	0	.2976
10	.6147[b]	.3991	.3944	.4061	.5566[b]	.6173[b]	.5445[b]	.5054	.2976	0

[b] Involves shipment by way of Country 2. For example, the freight rate from Country 4 to Country 1 is equal to the sum of freight rates (1) from Country 4 to Country 2 and (2) from Country 2 to Country 1. Shipment over this "indirect" route is cheaper than the "direct" route cost of $0.3618 from Country 4 to Country 1.

TABLE 3. DEMAND FUNCTIONS

Country	Price Dependent		Consumption Dependent	
	Price intercept	Price in absence of international trade	Constant term	Slope
	(1) *Dollars per bushel*	(2) *Dollars per bushel*	(3) *Million tons*	(4) *Million tons per dollar*
1	4.26	2.78	21.4229	− 5.0289
2	4.00	.88	70.8022	−17.7148
3	3.90	.72	22.5517	− 5.7757
4	3.93	.11	18.9544	− 4.8263
5	4.07	1.94	16.4834	− 4.0524
6	4.19	2.41	10.7454	− 2.5659
7	4.05	2.30	7.3665	− 1.8182
8	4.08	1.96	11.0292	− 2.7062
9	4.03	.86	4.1903	− 1.0394
10	4.18	2.76	8.0746	− 1.9330
"World"	4.04	1.35	191.6206	−47.4608

If we raise the Country 1 price in Table 4 to $1.721, total consumption is reduced 1.01 million units below the available supply. The sum of the slopes of all 10 demand functions is −47.4608 million units per dollar change in price. Hence, a price decline of

$$\Delta p = \frac{1.01}{-47.4608} = \$0.0213$$

in all regions would bring the system into a tentative new balance. This balance is shown in Table 5.

TABLE 4. EQUILIBRIUM SOLUTION FOR PRICES, CONSUMPTION AND NET TRADE UNDER FREE TRADE CONDITIONS

Country	Equilibrium price	Consumption	Production	Net trade	Origins and amounts of net imports: From country number				
					2	3	4	9	Total
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Dollars per bu.	*Million tons*	*Million tons*	*Million tons*	*Million tons*	*Million tons*	*Million tons*	*Million tons*	*Million tons*
1	1.521	13.78	7.44	−6.33	3.51	2.82			6.33
2	1.305	47.58	55.14	7.45			(1.80)[a]		
3	1.208	15.57	18.40	2.82					
4	1.165	13.33	18.43	5.10					
5	1.463	10.56	8.64	−1.92	1.92				1.92
6	1.523	6.84	4.57	−2.27	2.27				2.27
7	1.450	4.73	3.18	−1.55	1.55				1.55
8	1.428	7.16	5.74	−1.43			1.43		1.43
9	1.278	2.87	3.30	0.43					
10	1.571	5.04	2.74	−2.30			1.87	0.43	2.30
Total		127.56	127.56	0.00	9.25	2.82	5.10	0.43	15.80[c]

[a] Under the assumed structure of freight rates, this amount of feed is shipped to Country 2 and re-shipped to deficit countries in addition to the 7.45 million tons classed as net exports from Country 2.
[b] Includes 1.80 million tons received from Country 4 and re-shipped to other countries.
[c] Excludes 1.80 million tons of imports into Country 2 offset by re-export.
Note: Figures may not check in the last decimal place because of rounding.

TABLE 5. EQUILIBRIUM SOLUTION AFTER IMPOSITION OF $0.20 TARIFF BY COUNTRY 1

Country	Equilibrium price	Change in consumption	Net trade	Origins and amounts of net imports: From country number				
				2	3	4	9	Total
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(9)
1	1.700	−0.90	−5.43	2.73	2.70			5.43
2	1.284	0.38	7.07			(1.58)[a]		
3	1.187	0.12	2.70					
4	1.144	0.10	5.00					
5	1.442	0.09	−2.01	2.01				2.01
6	1.502	0.05	−2.32	2.32				2.32
7	1.429	0.04	−1.59	1.59				1.59
8	1.407	0.06	1.49			1.49		1.49
9	1.252	0.02	0.41					
10	1.550	0.04	−2.34			1.93	0.41	2.34
Total		0.00	0.00	8.65[b]	2.70	5.00	0.41	15.18[c]

[a] Shipped to Country 2 and re-shipped to other countries.
[b] Includes 1.58 million units received from Country 4 and re-exported.
[c] Excludes re-exports.

All exporting countries suffer some reduction in exports and slightly lower prices ($0.0213 per unit). All importing countries other than Country 1 presumably benefit by this price reduction, and they slightly increase their imports. Thus, while imports into Country 1 decline by 0.90 million units, the imports of other countries increase by 0.28 million units. The net reduction in international trade, then, is 0.62 million units, or about 3.9 percent of the original volume.[2]

[2] If one country raises its tariff, it is quite possible that some others will follow suit. The effects of any specific assumption about this can easily be demonstrated in the present model. The model does not, of course, tell us which countries (if any) actually

Effects of a discriminatory tariff

A discriminatory tariff, imposed by Country 1 upon imports only from (say) Country 3, would have somewhat different effects. Such a tariff, of $0.20 per unit, is equivalent to increasing the transport cost in Row 3 of Column 1 (table 2) from $0.3125 up to $0.5125 per unit.

This would be sufficient to shut off *direct* shipments from Country 3 to Country 1 entirely. But discriminatory tariffs are sometimes hard to police. For example, by accepting a price drop of $0.0592 relative to the initial price in Country 1, Country 3 could export its entire surplus to Country 2. Country 2 could then re-export these same units, or an equivalent amount from its own production. While Country 1 might be able to exclude units actually produced in Country 3, it would hardly act (on a tariff basis) to exclude increased imports from Country 2 which were made possible because of increased shipments from Country 3 to Country 2.

As it turns out, Country 3 can do a trifle better by selling to nations other than Country 2; specifically, Countries 10 and 6. In equilibrium,

TABLE 6. DISCRIMINATORY TARIFF OF $0.20 IMPOSED BY COUNTRY 1 ON IMPORTS FROM COUNTRY 3

Country	Equilibrium price	Change in consumption	Net trade	Origins and amounts of net imports: From country number				
				2	3	4	9	Total
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1	1.529	−.04	−6.29	6.29				6.29
2	1.313	−.15	7.60			(3.73)[a]		
3	1.161	+.27	2.55					
4	1.173	−.04	5.14					
5	1.471	−.03	−1.89	1.89				1.89
6	1.531	−.02	−2.25	1.62	0.63			2.25
7	1.458	−.02	−1.53	1.53				1.53
8	1.486	−.02	−1.41			1.41		1.41
9	1.257	+.02	0.41					
10	1.555	+.03	−2.33		1.92		0.41	2.33
Total		0.00	0.00	11.33[b]	2.55	5.14	0.41	15.70[c]

[a] Shipped to Country 2 and reshipped to other countries.
[b] Includes 3.73 million units received from Country 4 and re-exported.
[c] Excludes re-exports.

Country 4 stops exporting to Country 10 and sends the bulk of its exports to Country 2 for re-export. Prices in seven countries, including Country 1, rise about $0.008 per unit. Prices in Countries 9 and 10 fall by $0.016 per unit, as an indirect result of the pressure imposed on Country 3 by Country 1's discriminatory action. (Table 6.) After making the most profitable passive adjustment to the discriminatory tariff of $0.20, Country 3 finds its prices $0.047 lower than before, and its exports reduced by 0.27

will follow suit in a given case. It does tell us something about the economic pressures on each country and the sorts of reactions which would be consistent with certain criteria of economic rationality or self-interest.

million units, or almost 10 percent. Disruption of its normal market therefore has serious but by no means disastrous consequences for Country 3. The effects on all other countries are almost negligible, with prices and net trade changing on the order of 1 percent in most cases. The shrinkage in total international trade is about 0.6 percent.

Export subsidies

Suppose now that, starting from the initial free trade equilibrium, Country 4 adopts a general export subsidy of \$0.20 cents per unit. This is equivalent to reducing every transport cost in Row 4 (Table 2) by \$0.20.

It turns out that this action does not change the original "arrangement" of sources and destinations. However, it increases the price inside Country 4 by about \$0.18 and reduces prices in all other countries by about \$0.02 per unit. Exports from Country 4 are increased by 0.86 million units, while those from Countries 2, 3 and 9 are reduced by 0.36, 0.12 and 0.02 million units respectively—about 5 percent in each case. The increase in total net exports for the system is 0.36 million units, or about 2.3 percent.

If the expectation of policy makers in Country 4 had been an increase of \$0.20 per unit in the internal price as a result of the \$0.20 export subsidy, the actual result (an increase of \$0.18 per unit) might still have been highly satisfactory. But if Country 2 had applied this same subsidy (starting from the initial free trade equilibrium), its internal price would have risen only \$0.125 per unit, or 62 percent of the original (naive) expectation.

The difference is due simply to differences in the slopes of the demand functions in the two countries, relative to the sum of the slopes of the demand functions for all 10 countries. So long as no changes in the "arrangement" of sources and destinations are involved, the 10 country model can be treated formally like a two country model. In this case, the second "country" is the aggregate of all countries other than the one whose policy change is being investigated.

For example, the effect of a subsidy introduced by Country 4 can be appraised with the following model:

Country 4: Demand: $q_1 = 18.95 - 4.83\, p_1$
Supply: $z_1 = 18.43 + 0\, p_1$

All other countries: Demand: $q_2 = 172.67 - 42.63\, p_2$
Supply: $z_2 = 109.13 + 0\, p_2$

Substituting those coefficients in Equation (12) we obtain

$$(14)\quad p_1 = \frac{-[(18.43 - 19.95) + (109.13 - 172.67) + (0 + 42.63)\,d]}{(0 + 42.63) + (0 + 4.83)}$$

$$= \frac{64.06 - 42.63d}{47.46} = \$1.350 - 0.8982d$$

If there were no transport costs at all between countries, the price in Country 4 would be \$1.350 per unit. However, the original free trade equilibrium in the present model yields a Country 4 price of \$1.165. This may be taken to imply an initial value of d, $d_0 = \frac{1.350 - 1.165}{.8982} = \$0.206$, which is analogous to the single freight rate in a true two country model. With a \$0.20 subsidy, $d = 0.206 - 0.200 = \$.006$, and $p_1 = \$1.345$. The subsidy raises the price in Country 4 by \$0.18, as previously noted.

The corresponding model for Country 2 is as follows:

Country 2: Demand: $q_1 = 70.80 - 17.71\ p_1$
Supply: $z_2 = 72.42 + 0\ p_1$

All other countries: Demand: $q_2 = 120.82 - 29.75\ p_2$
Supply: $z_2 = 72.42 + 0\ p_1$

This model results in the equation:

(15) $p_1 = \$1.350 - 0.6268\ d$

As the Country 2 price was \$1.305 in the initial equilibrium, we may calculate an implicit value of d, $d_0 = \frac{1.350 - 1.305}{.6268} = \$0.072$. Adoption of a \$0.20 subsidy gives us $d = 0.072 - 0.200 = -0.128$, and $p_1 = \$1.350 + 0.080 = \$1.430$. The \$0.20 subsidy therefore raises the price in Country 2 by \$0.125 per unit.

We might take the value "one minus the coefficient of d" as a measure of the slippage in tariff or subsidy policies. This measure is simply the slope of the demand curve in a given country divided by the sum of the slopes in all countries in the trading system (slopes taken with the quantity variables dependent). If our model included price-dependent supply curves, the slippage coefficient would be

$$(16)\quad s_1 = \frac{\beta_1 - b_1}{\sum_{1=1}^{10} (\beta_1 - b_1)}$$

The β's are slopes of supply functions and the b's are slopes of demand functions, all assumed arithmetically linear.

The present examples suggest that the "four curve set-up" often used by foreign trade analysts may yield accurate results in a good many practical cases. However, large changes in tariffs or subsidies may disrupt the "arrangement" of trading pairs and lead to significant errors in the "four curve" (two country) model. Analysis of *discriminatory* actions obviously requires at least a three country model.

Effects of a two price plan

Two price plans of a "self-financing" type have received serious attention in the United States as a means of increasing exports of certain crops. Suppose that Country 2 decides to support its internal price at \$1.505 per unit (or \$0.20 above the initial free trade equilibrium) and export its surplus production for whatever it will bring.

In this case, consumption in Country 2 is reduced by $(-17.7148)(\$0.20) = -3.54$ million units and its exports are increased by the same amount. If the "arrangement" of trading countries is not affected, prices in all other countries will fall sufficiently to move this additional 3.54 million units into consumption. The demand function for all other countries is

$$(17)\quad q_2 = 120.82 - 29.75\, p_2.$$

If q_2 is increased by 3.54 million units, p_2 will be reduced by $(3.54 + 29.75) = \$0.1190$ from its original level. The price of exports from Country 2 will fall by the same amount, to a new level of \$1.186. The difference between this price and the price to consumers in Country 2 is $\$1.505 - 1.186 = \$0.319$ per unit. The impact of this policy upon other countries is equivalent to an export subsidy of the same amount (\$0.319), if total production in Country 2 is unchanged.

Other applications

The basic "arrangement" in our example is quite stable in the absence of discrimination. This stability is due to the fact that all of the countries are either strongly surplus or strongly deficit in the neighborhood of the free trade equilibrium.[3] This situation is often found in practice. Some countries are exporters of a specified commodity in all or nearly all years, while others are consistent importers. However, some countries will be close enough to a balance between production and consumption that they may shift from a net export to a net import position fairly often. The price changes occasioned by such shifts will depend upon the whole structure of transport costs and tariffs or subsidies, if any. If these price shifts were sufficiently large, domestic storage might be a profitable alternative to exports in years of above-average production (of an agricultural product).

To the extent that international trade problems involve a single commodity, it seems clear that significant insights and useful predictions can

[3] A severe drought in one or more of the normally surplus "countries" in this model can produce drastic changes in the pattern of prices and trade. The "arrangement" is by no means inviolate under extreme conditions.

be obtained from rather simple models. The limiting factor is likely to be our knowledge of the basic demand and supply functions in the various countries—not in our ability to manipulate the model once these functions have been estimated.

Problems involving two or more commodities

Significant substitutability of commodities in consumption and/or production means that producers of one commodity are very definitely interested parties in the trade and tariff policies of the other commodity group. The intensity of this interest depends, of course, upon the closeness of the competition. Models embodying two or more commodities can be handled fairly easily, but space precludes further discussion here.

During the past few weeks, Richard Taeuber and I have been experimenting with an extension of my 10-region feed model to include demand curves and supply curves for livestock in each region and the structure of freight rates for livestock between regions. Technically, this model involves 40 supply and demand functions, 180 freight rates, and a number of equations expressing equilibrium conditions. Actually, the model has not proved particularly difficult to manipulate using ordinary desk calculators.

There is need also of more complex models which would allow for movements of productive factors as well as goods and services; for fluctuating exchange rates; and for the role of currency reserves. Realistic treatment of such problems will involve rather difficult tasks of data organization and model building. Manipulation of the more complex models would require matrix algebra methods and possibly large scale computing equipment. But these are by no means insurmountable barriers.

Conclusion

I should like to return in closing to the argument that economic models of foreign trade may be rendered useless by political factors. An economic model is valid, in my opinion, if it reflects fairly accurately the pattern of prices and trade which would result from given initial conditions in the absence of further policy changes. Such a model at least reflects the *economic pressures* that are imposed upon producers and consumers in other countries. The governments of these countries may take actions to mitigate or offset such pressures. The prediction of government actions in other countries with better than random accuracy depends on both economic and political intelligence (and by "intelligence" I mean primarily information brought together from regular public and diplomatic sources).

The pressures on other governments resulting from a specific change in United States foreign trade policies depend partly at least on the real

economic effects of the change. The political response may or may not be proportionate to these real economic effects. But sound estimates of the real effects should help us to recognize truly disproportionate reactions and to negotiate more realistic compromises.

DISCUSSION

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Dr. Fox has made important contributions to the empirical analysis of demand in recent years. He is continuing to do so in his current paper on the use of economic models in appraising foreign trade policies.

He is not sympathetic to the notion held by some workers in our profession that models are a vague figment of the imagination drawn out of thin air by a theoretical economist. Fox believes that economic models are useful. In fact, he believes they are necessary to economic analysis in reaching certain policy recommendations where the quantitative measurement of the results of alternative courses of action is important. In this paper he shows how models can be used in the analysis of problems concerned with international trade relationships.

Fox recognizes that foreign trade models are apt to be more complicated than those dealing strictly with domestic problems and that foreign trade is more likely to be influenced by "arbitrary" changes in the rules. A number of models used to illustrate the analysis of various problems in international trade constitute the major portion of his paper. More complicated examples deal with tariffs, export subsidies, two price plans, and supply curves which are responsive to price changes. He makes various manipulations to show the expected effects of these trade barriers on prices and the pattern of trade. As in a Walrasian equilibrium model, his sets of equations are algebraically solved for prices, quantities traded, and other variables.

In studying some of his illustrations I gained the impression he was implicitly assuming that stable economic coefficients exist. Could these be similar to π, the speed of light, and atomic weights? I am certain, however, that Fox would want to know the statistical confidence limits of any coefficient studied before using it as the basis for a policy recommendation or decision. For instance, he estimates in his paper that many coefficients are known to be accurate within a range of about 20 percent.

The recent emphasis on econometrics and activity analysis may have given some of us the impression that theoretical models are a very recent addition to the bag of tools available for economic analysis. This is far from true. Economists, as well as students and researchers in other fields, have used models since the origins of their disciplines. Relationships, which are formulated as hypotheses, are derived from observations. As these observations are replicated and the relationship observed is repeated continually, a law or a theory is evolved. Whether we realize it or not, we use a theory or model when we make any analysis of past events. These happenings of the past shape our judgments about the present and our predictions for the future.

Let us consider briefly some of the models used by economists concerned with international trade relationships. The mercantilists, whose ideas held sway in England about a century and half ago, derived the thesis that a country

was better off when it had a so-called "favorable" balance of trade and acquired large stocks of gold and other precious metals. We are all familiar with the example showing the comparative cost of wine and cloth used by Ricardo and Mill in the classical theory. It illustrated the mutual benefits of international trade and showed the range of conditions within which trade would occur. Various modifications of this theory have since been made. In addition, the general equilibrium or mutual interdependence theory of Hecksher and Ohlin and the adaptations of trade theory resulting from the Keynesian influence have been put forth to explain the operation of the international economy. But none of these theories can be said to form a completely accurate description of our trading system today.

In conducting research on trade problems we make certain assumptions which have been derived from past experience. These are, in effect, conditions that are normally expected to prevail. Our results are usually valid only when these assumptions are in accord with actual conditions.

In analyzing foreign trade problems a simple equilibrium system may suffice in certain cases. In others the use of all available theoretical tools of economics and statistics—plus some of those from political science, sociology, and psychology—may give only a sketchy view of the situation. Features of trade policies such as tariffs and subsidies generally offer very little difficulty in manipulating a model to solve international trade relationships. However, exchange controls, multiple exchange rates, quotas, embargoes, and other arbitrary barriers do constitute roadblocks to the effective use of models of the nature advocated by Fox. Here perhaps is where one or more of the limiting assumptions can be made and the analysis improved accordingly.

Fox anticipates the major criticism which may be directed at his paper. He would not throw economic models aside as a means of analyzing trade relationships because these relationships are likely to be influenced by changes in the rules. I would agree with him. Only by making a competent quantitative estimate of the economic effect of political action to build or ease trade barriers can the economist make his greatest contribution.

Accurate quantitative coefficients are important facts needed by policy makers in arriving at recommendations for future programs and their implementation. Such information may be concerned with an overall commodity trading pattern or with the problems of a single industry. As is true with many other American agricultural commodity groups, the Florida citrus industry believes there is a large latent demand for its products if the authorities who control foreign exchange transactions would release dollars to be used for purchases of these commodities. On the other hand, trade ministries abroad argue vigorously that the United States can sell more abroad if our customs procedures are simplified and other trade barriers are lowered so as to encourage dollar earning exports from their nations to ours. Certainly good estimates of the nature that an adequate model might yield would aid our policy makers and affected industries to take steps which would lead us toward a beneficial expansion of trade and an equilibrium position in our balance of payments.

Although foreign countries have liberalized their convertibility restrictions and their supply of dollars has increased in the past few years, much effort has yet to be exerted to return the world economy to a competitive trading basis.[1]

[1] This does not imply that large elements of monopoly or monopolistic competition are not present in international trade.

A great deal of selling effort will be required to make price competition effective in selling American farm exports abroad. This is true even should domestic prices reach an equilibrium level with world prices. Foreign nations also have a large selling job to do if they are to enlarge their sales here. When foreign trade is again on a current-payments basis, economic models should be more useful tools than in the recent disrupted years.

In our unsettled trading world of today economic models will obviously fall short of giving us practical quantitative estimates of all the parameters needed for accurate predictions. The international trading economy has had to adjust to a large number of shifts in policy and trading patterns—some of a temporary and others of a more permanent nature—in the postwar period. Nevertheless, economic models will give us much useful information which can be supplemented by political, sociological, psychological and other economic intelligence on a less formal basis. The major problems will not arise in the manipulation of models—even for complicated ones—but in the delineation of the relationships and variables necessary for analyzing the effect of arbitrary changes in trade barriers. Certainly a full consideration of the effect of all variables known to bear upon a problem will yield a superior policy recommendation. I would agree with Fox that shrugging off this task because it is too complicated and because a complete statistical model cannot be constructed is, to say the least, a feeble excuse.

CONSIDERATIONS IN EVALUATING THE EFFECTS OF FOREIGN AID PROGRAMS ON TRADE IN FARM PRODUCTS*

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DURING the past fourteen years the United States has sponsored or participated in four major and over twenty minor foreign aid programs. These range from commodity gifts of wheat or military items to dollar loans and gifts via comprehensive multilateral planning operations such as the European Recovery Program. I should like to summarize our experience under these programs as they relate to farm products, and to pose some issues which are and will continue to be important.

A number of significant developments are evident in the succession and overlap of foreign aid operations. Insofar as these affect agriculture there has been a sharp shift from an easy flow of farm commodities which cooperating nations needed for war and postwar recovery efforts to a situation in which farm commodities move under a variety of special programs under pressure. Present farm export drives have their predecessors in amendments offered to earlier foreign aid programs. Other changes in emphasis and direction are evident as the dynamic administrative, political and economic structures of these operations are studied.

In discussing these changes attention will be given first to the multiplicity of foreign aid programs and the role of agriculture, then to important accomplishments, third to central threads of development and finally to future problems.

Kind and Amount of Foreign Aid

Over $90 billion of foreign aid has been made available by the United States since 1940.[1] About $16 billion of this amount has been spent for farm products (See Table 1). Lend-Lease[2] represented about half of the total funds made available but food played a minor role, representing about 15 percent of the total. Military equipment and munitions of course were a principal concern.

In the interim period between the occupation of enemy held areas and the start of the Marshall Plan a variety of programs were operating total-

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** I am indebted to Luther Pickrel, James Rock, James Shaffer, and Dale Hathaway for suggestions on improving the original draft.

[1] William Adams Brown, Jr., and Redvers Opie, *American Foreign Assistance*, Washington, D.C.: The Brookings Institution, 1953.

[2] Some early help was provided to Latin America in arms, Export-Import bank loans, etc.

ing some $15 billion of grants and loans.[3] These include the civilian supplies to occupied areas (now called GARIOA—Government and Relief in Occupied Areas), UNRRA, the British loan, Greek Turkish aid, Philippine Rehabilitation, Surplus Property credits, Export-Import Bank loans and Interim Aid in anticipation of the Marshall Plan. In some of these programs such as UNRRA and Interim Aid 40 percent or more of the expenditures were for food, plus some cotton and tobacco, fuel and fertilizers. In the aggregate farm products become more important than

TABLE 1. VALUE OF U. S. AGRICULTURAL EXPORTS—COMMERCIAL AND AID PROGRAMS (billions)

Year	Agricultural Exports	Aid Programs		Percentage Under Aid Programs
		Amounts	Major Kind	
1941–42	$1.0	$0.7	Lend-Lease	70
1942–43	1.5	1.2	Lend-Lease	80
1943–44	2.3	1.8	Lend-Lease	78
1944–45	2.1	1.6	Lend-Lease	76
1945–46	2.8	1.4	Lend-Lease, UNRRA	50
1946–47	3.6	.8	UNRRA, GARIOA	22
1947–48	3.5	1.6	Interim Aid, GARIOA	46
1948–49	3.8	2.3	ECA, GARIOA	60
1949–50	3.2	2.0	ECA	62
1950–51	3.4	1.2	ECA	35
1951–52	4.0	.7	ECA, MSA	17
1952–53	2.9	.4	MSA	12

Sources: 1941–49: Lawrence Witt, *Agriculture, Trade and Reciprocal Trade Agreements*, Tech. Bull. 220, Mich. Agric. Exp. Station, June 1950. 1950–53: *Foreign Agricultural Situation, Maps and Charts*, Foreign Agric. Service, Oct. 1953.

under Lend-Lease although the complexities of the administrative structure of aid in this period make quantitative estimates difficult.

The third period is dominated by the European Recovery Program. Total aid, including occupied areas, was some $25 billion for the fiscal years 1948 through 1952.[4] During the first year food, feed and fertilizers represented about 40 percent of the shipments. Adding tobacco and cotton, agricultural products came to about half of the total expenditures. In later years, however, exports of farm products became smaller in proportion as pipelines were filled, overseas agricultural production increased and as incentive goods and more stable currencies drew farm commodities back into the market structure.[5] The food, feed and fertilizer item declined to only 20 percent of the total in the 1950-51 fiscal year.[6] Increases in cotton and tobacco made up for only part of the decline in

[3] Brown and Opie, *op. cit.*, p. 116.
[4] *Idem*, p. 430.
[5] Economic Cooperation Administration, Reports to Congress 1948 to 1951.
[6] Brown and Opie, *op. cit.*, p. 220.

other farm products. In aiding recovery ECA put more emphasis on industrial raw materials and industrial rehabilitation. During both periods food consisted of a somewhat larger share of the area total in the Orient than in Europe.

The present foreign aid program consists of three major parts—Military Aid, Economic Aid (presumably supporting defense activity) and Technical Assistance. Again, these are combinations of several programs starting with the Military Assistance Program of 1949, and the Act for International Development in May 1950 with the former revised under the Mutual Security Act of 1951 with subsequent amendments.[7] Under these programs there was a definite turning away from the export of farm products. A 1953 amendment under Section 550 of the Mutual Security Act provides that between $100 million and $250 million worth of surplus agricultural commodities may be purchased in the U. S. for sale to friendly countries for foreign currencies, if sold in addition to the usual foreign purchases. This program is scheduled to continue in 1954-55. In addition the Agricultural Trade and Development Act appropriated $700 million for surplus sales for foreign currencies and $300 million for gifts as a continuation of famine relief. These measures are in sharp contrast to the early ECA period when the major concern was with amendments to prohibit the export of farm products which were in short supply.

Despite these efforts farm products constitute a smaller share of the total program than in earlier periods. Under MSA in 1953 some $3 billion worth of weapons and military equipment were shipped to Europe. About $250 million worth of agricultural products had been sold by July 1954 under Section 550, plus some $8 million of special aid to Bolivia, plus 700,000 tons of surplus wheat to Pakistan under separate legislation, plus other food shipments to East Germany, Jordan, Libya, Iran, Israel, Korea and Spain under several different statutes.[8] These sales of farm products represent about 10 percent of the expenditures under the combination of Military Aid, Economic Aid and Technical Assistance.[9]

A summary of agricultural exports in total and under aid programs is shown in Table 1. During the war and again in 1948-50 from 60 to 80 percent of agricultural exports were provided through foreign aid. Looked at in another way, the volume of exports rose from about 6 percent of farm income in 1940 to over 12 percent in 1946, 1947 and 1949 dropping back down to about 8 percent in 1953.[10] Given the inelasticities of demand

[7] These are being amended and integrated in a comprehensive Military Assistance Act now before Congress.

[8] Mutual Security Program, *Report to Congress*, December 31, 1953.

[9] This does not include subsidies under the International Wheat Agreement.

[10] Foreign Agricultural Service, *Foreign Agricultural Situation 1953*, and Foreign Agricultural Trade, monthly reports 1953.

for food it appears that the cash values of farm products were increased substantially by expansion in exports, and have decreased with the recent contraction. Additions and subtractions from government stocks as well as changes in domestic consumption modify the price conclusion which otherwise might be drawn from a simple comparison of changes in exports with usual price elasticities. As a percentage of total exports, farm exports have been declining for a century except after World War I and again after World War II. The declining trend is once more in evidence particularly after 1951 when value, volume and percent of farm exports have all shown reductions. The upward bulge during the major foreign aid programs and postwar rehabilitation disappeared.

Accomplishments of the Program: Agricultural Phases

This is not the place, nor is time available to evaluate the over-all accomplishments of these various programs. Let me simply point out that Lend-Lease emphasized more effective prosecution of the war; the European Recovery Program, an investment in the economic recovery of the people, farms and factories of Europe; Government and Relief in Occupied Areas, the maintenance and later rehabilitation of former enemy areas; and Mutual Security, the strengthening of friendly nations on one side of the bipolar world struggle for power. All of them are in some degree mutual programs proposed and defended in the larger conception of American interest and foreign policy.

Food and farm people, of course, play a role under each of these diverse programs. During much of the period U. S. exports were important in providing a necessary margin between subsisting or starving and being able to make an active contribution to the economic recovery of the overseas areas. This was a short time emergency demand which could not be expected to continue; nonetheless the shipment of food and its accomplishments have important long-time benefits to the level of European and world economic activity as well as returns in political, social and psychological terms.

Feed, fertilizer and the exchange of recent technical information speeded up the recovery process in agriculture so that by 1949 European agricultural production was at prewar levels and by 1953 was 20 percent above prewar or about equal on a per capita basis. This is in contrast to World War I when full agricultural recovery was delayed until about 1926. Much of this recovery of course was due to European efforts–improvements in European agricultural technology and the development of new agricultural institutions during the inter-war period. In the Far East recovery was less rapid, in part because of continued political unrest.

On the United States side the large food shipments reduced the speed of surplus accumulation. The technical progress of agriculture, the expanded crop acreage, the favorable weather and support prices which reduced uncertainty would have led to a serious accumulation of surpluses were it not for the stepping up of exports. The lack of pressure on support prices made it politically easier to extend 90 percent guarantees for storable commodities. This seems to have a number of consequences.

First, high level support prices now have an even longer history and became that much more difficult to dislodge, even in a limited way. The memories of dollar wheat and ten-cent cotton fade further into the background so that wheat at $1.50 and cotton at 20 cents seem much more unjust to farmers today than they would have in 1948. These are important beliefs and values. Cost structures have become adjusted to higher prices. Congressmen have heard forebodings of disaster over and over, yet have seen the program ease through several crises and are less impressed by the prophets of agricultural gloom.

Second, the real pressure for importing in order to export comes into the decision making area after a considerable delay. While difficult even at that time, it would seem that there would have been more chance to push through a program to stimulate imports immediately after the war than at the present time. Circumstances, however, applied little pressure for this action, since most countries were pitifully lacking in any important export potential. Now when they have goods to send us the process of attrition on U. S. imports is well under way. Some farm products are among those for which imports have been restricted under escape clauses of the Reciprocal Trade Agreement Act (dried figs) and under Section 22 of the Agricultural Adjustment Act (dairy products).[11] Other sectors of agriculture such as tobacco, cotton and wheat, find that opportunities for export under normal commercial trade are limited by the amount of dollar earnings and especially by the uncertainty over U. S. policies which discourage foreign businesses from planning aggressive programs for U. S. markets. Limited foreign dollar earnings and uncertainty about future earnings reduce the willingness to make purchase commitments for farm products.

These comments of course do recognize that farmers gained considerably from the facilitation of exports under foreign aid programs, both from the stimulation to price and from the maintenance of support prices –the latter due only in part to foreign assistance programs. The resulting higher prices and lessening of uncertainty also stimulated the more rapid

[11] United States Tariff Commission, *Operation of the Trade Agreements Program*, Sixth Report, July, 1952-June, 1953.

adoption of improved technology, more efficient resource allocation, etc., with a consequent more rapid expansion in agricultural production. Whether the gains in the period of foreign aid will be offset by a more difficult readjustment period remains to be seen.

Changing Relationship of Farm Exports to Foreign Aid

Legislation designed specifically to favor farm exports is being approved more readily than in the past. Under Lend-Lease there were no exceptional provisions to support or exclude special groups of exports. Under Interim Aid and the early stages of the Marshall Plan some efforts were made to try to limit the export of certain products so as not to short U. S. consumers of products they would like to buy. In later periods provisions to encourage farm product exports were proposed and to an increasing extent approved by Congress. Subsidies to farm exports or other procedures to encourage export disposal have shifted from circumspect minor aspects of major programs to being the central core of substantial programs. At the same time there may be noted an increasing emphasis on bilateralism in the conduct of the programs. These and other trends became clear as important aspects of policy are specified.

The UNRRA program placed heavy emphasis on food in contrast to the military emphasis of Lend-Lease. Since overseas needs were sharply focused on food items, this emphasis was primarily a response to postwar exigencies. Despite this, criticisms of the multilateral aspects of the program helped lead to its early downfall.

Under the ECA program the United States operated bilaterally with the recipient nations and with a multilateral planning organization—the Office of European Economic Cooperation (OEEC). The latter, however, provided a means by which joint European pressures could be focused vis-a-vis the United States. Thus the ECA cannot be considered as wholly a bilateral program. A few protectionistic devices were added by unilateral decision, such as the requirement that 25 percent of the wheat be exported as flour, and that 50 percent of all assistance goods be carried in American ships.

The second and third year of the ECA program saw strong efforts to refashion ECA towards the export support of coal, machine tools and agricultural products. Provisions favoring the latter came closest to enactment when $1.5 billion was set aside from the second year appropriations by the Senate Committee exclusively to procure agricultural products. This was eliminated on the Senate floor at the plea of the ECA administrator that he did not want a rigid budget and that this would be used by Soviet propagandists to justify their assertion that the Marshall Plan was directed to dumping American surpluses in Europe.[12] The plea

[12] Brown and Opie, *op. cit.*, pp. 167-170.

of the administrator was also supported by some outside groups interested in maintaining unblemished the broad humanitarian goals of the program. Protectionism was also discouraged when an effort to require 15 percent of the corn shipments as grits and flour was defeated in conference. And the 25 percent provision on wheat flour was cut to 12½ percent in the second, and eliminated in the third authorization act.[13]

While these efforts to increase exports via foreign aid failed several other measures came into operation which did encourage the overseas movement of American farm products. One of these dealt with procurement sources. By simply declaring a farm product in surplus supply the Secretary of Agriculture could force ECA to buy in the United States, with an administrative exception being made for Canadian wheat to Great Britain. Under existing conditions of world wide shortage and efforts at international price control differential procurement was probably most important for cotton—then under reduced export subsidy, and possibly tobacco. More important was the provision under the ECA Act that Section 32 funds of the Agricultural Adjustment Act could be used to pay up to 50 percent of the cost of surplus food sent overseas. Eventually this involved the sale of about $70 million worth of dried fruits, eggs, peanuts, flaxseed, linseed oil, grain sorghums, wheat, wheat flour, citrus fruit, pears and tobacco.[14] This means that only about 2 percent of the total ECA food shipments moved with export subsidies ranging up to 50 percent of U. S. values.

The ECA history suggests that direct efforts were largely defeated. It is more difficult to evaluate whether pressures to push particular products did result in warping administrative decisions and allocation among food commodities or between food and other goods. Did pressures from Washington administrators on field personnel and from them in turn to their local European and Far Eastern counterparts influence the amount and kind of commodities requested from the United States? It must also be recalled that within European countries there was considerable pressure for food imports. With the need to adjust requests to availabilities it seems that a strong case can be made for the ability of ECA to make the proper broad scale decisions. This accomplishment was made easier by the fact that European and Asian needs and requests were for large amounts of food. Had the food requests been smaller the pressure for forcing farm exports might have been more difficult to withstand.

One of the possible exceptions to these conclusions, dried fruit in 1947-49, seems to be more chargeable to GARIOA than to the ECA. Procurement via the CCC of dried fruit in 1948 was almost entirely by

[13] *Idem.*

[14] Economic Cooperation Administration, *op. cit.*

the army while in 1949 Bi-Zone Germany procurement by the army was 33 percent larger than ECA procurement for the rest of the world.

This pattern exemplifies one of the problems of our segmentized federal government. While the administrator of a major program was able to withstand and fight back against narrowly conceived particular interests, amendments to the CCC charter authorizing export sale for local currencies and strategic commodities, pressures on army procurement, etc., made possible the advancement of particular interests in similar but peripheral foreign aid and export programs which were less in the public spotlight. This is, perhaps, one reason why multiple programs develop.

In the more recent period special legislation seems to be more readily adopted. Under the omnibus foreign aid program there are limited export opportunities for farm products under the Mutual Security and Technical Assistance Titles. Under the Economic Aid Title pressures for shipments of farm products have become more intense. Under Section 550 of MSA, Wheat for Pakistan and the Agricultural Trade Development and Assistance Acts, already mentioned, strong efforts are being made to expand sales. The CCC continues to use Section 32 funds of the AAA to dispose of accumulated supplies at home and abroad. The growth and acceptance of these programs represent Congressional acceptance of the idea of subsidized exports and an international two price system. In addition, export subsidies or losses under the International Wheat Agreement now approximate $550 million. These are not proposals but actual policy.

Except for the Wheat Agreement these programs are completely bilateral. Efforts of the U. N. Food and Agriculture Organization to play a role in the decision making process have not been successful. No other multilateral efforts have been seriously suggested. Moreover an increasing number of conditions are being attached to these programs with a consequent limitation of the freedom of action of other nations. Many of the efforts to expand farm exports are by measures outside of aid programs. If it is necessary to have such programs, they probably should be separate for psychological and propaganda purposes, but it may be politically easier to deemphasize them in an integrated program. Administration and integration of policy goals is made more difficult with separate programs.

It has already been suggested that the role of farm products in a military preparedness program is limited. Under both Lend-Lease and Mutual Security farm products were less important than in the recovery period. In fact under the stress of international insecurities, each country will strive to become more self-sufficient in food and reserve more of its limited dollars for the raw materials and military items needed to build up its defenses. Military aid by the United States undoubtedly releases

free dollars for non-defense items given the same level of military build-up. But it must also be recognized that the level of military expenditures and international tensions probably would be different were it not for the position being taken by the United States.

The major focus of present foreign aid programs is the facilitation of shipment of military end items from the United States. In calendar 1953 military shipments were about $3.8 billion while for calendar 1954 procurement on offshore contracts is expected to be only a half billion dollars.[15] The "Buy American" principle is strongly in evidence along with security conceptions which prefer to maintain production facilities in this country. In effect this means that we are operating *as if* we had a comparative advantage in the production of military items relative to farm products and other commodities. Greater offshore procurement of military items would provide foreign purchasers with more freedom of action in buying the American products they considered more advantageous. The evidence is that contracts are placed in the United States even at 30 to 50 percent higher cost.[16] This indicates that political and administrative decisions are hampering and circumventing efficient international division of labor. Whether the hard facts of international political tensions warrant these decisions is beyond the scope of this paper. It should be pointed out that greater offshore procurement exposes the United States to the risk of building up and losing important production facilities in case of war, but increases the probability that greater employment, dollar earnings, etc., in the particular foreign country will cement these nations more firmly into our political and military orbit. These serious international questions need further public discussion.

Despite efforts to broaden their viewpoint most people continue to look at exports separately from imports. The close inter-relationship of the two still is not understood by the general public. Efforts to implement the slogan "Trade, not Aid" have bogged down. In fact it may be argued that the grants made under various foreign aid programs in effect separated export decisions from import decisions and made the eventual reconciliation more difficult, if it is to come. The failure of imports to expand make the problem of export crops more difficult. There is no assurance that farm exports will respond to a sufficient extent even with more competitive international pricing.

As suggested earlier, foreign aid programs resulted from critical overseas needs and desires for food. Thus the implementation of foreign aid programs helped keep surpluses from accumulating, and in fact buoyed

[15] Military Security Program, *op. cit.*

[16] Newspaper accounts suggest that Congress is more willing to cut funds for overseas procurement than funds for domestic procurement.

some farm prices well above support levels. At the present time the effect of aid sponsored farm exports is to reduce somewhat the embarrassingly large supplies and may help keep actual prices from being quite as far below support levels as they otherwise would be.

Future Problems in Farm Trade

It is not likely that the agricultural foreign trade problems will be quickly resolved. So long as protectionistic elements remain strong in the body politic, imports will not provide the dollars needed to facilitate farm exports. Economic changes seem to be eroding away some of the comparative advantage which some agricultural products once had. Foreign countries are using limited dollar earnings for industrial products whose comparative advantage is greater. Internal price levels of major export items do not permit the real comparative advantage of cotton and tobacco to express themselves. And they continue to discourage the conversion of more wheat into livestock feed. Short of a series of drastic crop failures or a fresh outbreak of military action it appears that Commodity Credit stocks will continue to be large. The fact of government accumulation of some commodities is likely to continue to argue for removing past trade concessions for actual and potential farm imports, which compete with domestic supplies.

The inclination to limit foreign aid and the emphasis placed on military aid is further discouraging to farm exports. Decisions on overseas procurement policies have in effect artificially increased the comparative advantage of military industrial goods.

Foreign aid programs as they operate today and as they are likely to operate short of war are much less favorable to agriculture than the programs in operation during the five year period following World War II. Consequently it is probable that efforts will be made to continue the search for better ways of disposing of more farm products overseas both through foreign aid and outside of foreign aid programs. Emergency shortages in friendly and neutral countries are likely to bring quick Congressional approval to special gift or loan programs in farm products. Even enemy areas are included. These are efforts hoping to avoid needed internal adjustments. In the development of these programs it is evident that the major emphasis is upon increased overseas disposal. These efforts are too exposed to the accusation that aid to other countries is designed primarily to protect the domestic economy. More attention should be given to ways of using food disposal as an additional weapon of diplomacy and to integrate and consolidate the use of our various diplomatic weapons. Food is too important a resource to have its effectiveness thus weakened by a piecemeal and partial approach.

The support in Congress and pressure upon it to increase agricultural exports suggest dissatisfaction with the current export situation. But there does not seem to be a disposition to take a long look at the basic problems. More flexible supports and the continuance of export subsidies which bring real export prices more in line with world prices are not likely to be a sufficient long-run encouragement to overseas shipments. At the same time other countries are lodging objections to American action in the trade sphere. It is likely to become increasingly difficult to reconcile American international agricultural policy with the principles of international economic policy which are nominally held by ourselves and others. Searching for ways to bring Congress and the public to grips with the real issues in international policy and to resolve current dilemmas will continue to be baffling area of public policy.

DISCUSSION

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One can find little to disagree with in Dr. Witt's summary of the effects of foreign programs on foreign trade in farm products. Gaps in food supplies such as existed following the wars stimulated exports far out of proportion to what can be expected to continue under so-called normal conditions. Neither can we depend on disaster or the periodic droughts as they occur in different areas, serious as is the need, to furnish outlets for the surplus agricultural products of the United States.

As he has pointed out, the drop in economic foreign aid will result in a further decrease from the large quantities of food and fibre shipped abroad immediately following the war to replenish shortages. Active efforts should be continued to maintain foreign outlets for our agricultural products insofar as possible and to develop new ones. The Foreign Agricultural Service and the special missions such as were sent abroad recently to study this problem should continue to explore every possibility for developing such markets.

In spite of the fact that we are emphasizing a two-price system and that major emphasis seems to be placed at the moment on foreign markets to absorb governmental stocks acquired under the support program, this does not appear to be a sound method of approaching the problem. Witt calls it a baffling problem, but we cannot let it rest without further examination.

The real problem which should be re-emphasized and to which this session cannot give adequate treatment is to adjust our domestic production more in line with the demands of the domestic market instead of trying to maintain artificially high prices and dumping abroad. This dumping policy can only be a temporary expedient and one which does not merit continued public support. It cannot be the basis of our long-time agricultural policy, as it will have repercussions more serious than its advantages. Please do not misunderstand me—we must make vigorous efforts to maintain and secure foreign outlets for

our agricultural products, but in the long run only if we can compete with production from other areas.

Furthermore, if we are to maintain such markets it will be necessary for us to develop a more consistent foreign policy with respect to imports. Too little attention is being devoted to this phase of the problem, both in industrial and agricultural circles. Continued careful economic evaluation of the potentialities of foreign trade and all its implications needs to be made as a guide to policy in this field. "Trade not aid" is a term used all too loosely in our discussion of foreign economic assistance.

Perhaps it's too simple. To export it is necessary to import or furnish the credits to other countries some other way. Foreign nations are worried about our trade policies just as we are about theirs. The cheese embargo, a few years ago, is an example. The marked shift recently in our agricultural policy in favor of export dumping also is causing grave concern to nations that are trying to restore their agricultural production under the difficult situations since the war. The recent watch case, for example, is one that may affect our future trade in Europe. If we are not willing to permit imports from other countries, how can we expect them not to look behind the iron curtain as an outlet for disposing of their own production. This over-all problem is definitely tied in with the problem of exporting our agricultural products.

So, while our foreign aid should stress outlets in other countries, we should devote more study to means of development of an active program to adjust our production to demand and at the same time foster shifts in the use of resources to best alternatives. Our pricing system should more nearly reflect to the farmer the value of the additional product he sells rather than to be such as to stimulate continued or increased production of a product not in demand.

THE CURRENT AND PROSPECTIVE FOREIGN TRADE SITUATION WITH RESPECT TO FARM PRODUCTS

GUSTAVE BURMEISTER
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THE PRESENT and prospective foreign trade situation with respect to farm products has recently been appraised by the Agricultural Trade Missions, which visited 35 countries. They have concluded that the United States, over a period of time, can increase its agricultural exports materially, if certain obstacles are overcome, even though immediate prospects of great increases are not good.[1] I believe this is a correct appraisal of the situation confronting us.

Before discussing these prospects I would, however, like to say a few words about the relationship of our foreign agricultural trade to production and marketing in the United States.

As you know, United States agricultural output increased 40 percent during the last 15 years. This increase took place in response to the rise in population and living standards in this country and in response to large emergency demands abroad that resulted from World War II and its aftermath.

At present, the productive capacity of American agriculture is in excess of current market demands at home and of our shrunken export outlets. Large surpluses, therefore, have accumulated in Government hands.

Let me give you a few details: Agricultural exports which had reached a peak of $4.1 billion in 1951-52 dropped 30 percent in the course of a year,[2] and, during 1953-54, remained near this reduced level of $2.8 billion. Most of the drop has occurred in our major cash export crops; wheat, cotton, tobacco, grain sorghums, and soybeans.[2a] This has meant loss of the market for one-third of the output of an estimated 52 million acres devoted to raising export crops in 1951.

Foreign as well as domestic markets must be expanded if, in the future, we are to find adequate outlets for our expanded agricultural production.

Significance of Domestic and Foreign Markets

In seeking larger outlets, we must, however, bear in mind the relative magnitudes of the domestic and the foreign market for American farmers

[1] Report of Agricultural Trade Missions to the Secretary of Agriculture on Foreign Trade of the United States in Agricultural Products. Washington, June 1954.

[2] U. S. Dept. of Agriculture, *Foreign Agricultural Trade*, "United States Foreign Trade in Agricultural Products," Fiscal Year 1952-53 with comparisons.

[2a] For details see: United States Department of Commerce, Foreign Commerce Weekly, June 28, 1954.

and the trend in demand for farm products here and abroad.

From the point of view of the relative importance of the domestic and the foreign market, our agricultural products fall into four groups. (See Appendix 1.)

(1) *Products with respect to which we are about self-sufficient and both exports and imports normally amount to less than 5 percent of the cash farm receipts.*—This group accounts for as much as two-thirds of the cash income of our farmers. It includes most livestock and livestock products, vegetables and greenhouse products, cottonseed, peanuts, hay and fodder, deciduous fruits, and berries.

(2) *Products of which we are substantial net exporters.*—For some of them, such as cotton and linters, wheat (including flour), tobacco, rice, lard and tallow, exports normally account for one-fourth or more of total sales. Other important export products are soybeans, corn, grain sorghums, hops, and a variety of fresh and processed fruits. Altogether the products in this group account for about 30 percent of the cash income of our farmers.

(3) *Products of which we are large net importers as well as important producers.*—This group accounts for about 3 percent of cash farm income. Imports for a number of items in this group are in excess of domestic production. This is the case with respect to the two largest items—sugar and wool. Other items in this group are olives and olive oil, field and grass seeds, tree nuts (of domestic types), figs and dates, and, more recently, tung nuts.

(4) *Products not commercially produced by American farmers.*—Some of these are substitutable for domestic products, as, for example, tropical oilseeds and oils expressed therefrom, certain waxes, and foreign-type nuts such as Brazil nuts and cashews. Most of the products in this group are not, however, directly competitive with products of American farms. Among the latter are coffee, rubber, cacao and tea, certain hard fibers, carpet wool, raw silk, bananas, and a variety of spices, drugs and herbs, and essential and distilled oils.[3]

Agricultural Imports Exceed Farm Exports

If we add up these four groups, we find that we import substantially more agricultural products than we export. In the last calendar year, for example, we exported $2.8 billion worth of farm products but imported $4.2 billion worth. More than half of these imports (or $2.4 billion) consisted of products which, as I have just pointed out, are not directly competitive with United States farm products. Of the remainder, one-half belongs to the category of products for which imports are substantially in excess of exports. About $200 million worth consists of products directly interchangeable with domestic farm products. About $200 million of our agricultural imports consisted of products of which exports have been substantially larger than imports. The rest (about $450 million in the last

[3] A more detailed discussion of these four groups is contained in the March 1954 issue of *Foreign Agriculture*, entitled "Agricultural Products in United States Foreign Trade."

calendar year) belong in the category where both imports and exports are relatively unimportant.

The fact that the United States is a substantial net importer of agricultural products deserves consideration in the international discussions of trade and payments problems. Insofar as agricultural trade is concerned, the so-called dollar gap has been closed prior to Korea, and the rest of the world has been a net dollar-earner in this sector ever since—just as it was before World War II.

TABLE 1. VALUE OF UNITED STATES AGRICULTURAL EXPORTS AND IMPORTS 1950–1953

Year ended December 31	Domestic exports Agricultural	Imports (for consumption) Agricultural
	Million dollars	*Million dollars*
1950	2,873	3,990
1951	4,040	5,166
1952 prel.	3,431	4,518
1953 prel.	2,844	4,182

Note: For details see Appendix II.

The New Buyers' Market Overseas

As you know, the volume and value of our agricultural exports were high above the prewar level. This was due to the emergency needs in foreign importing countries, to United States aid that enabled foreign countries to import more than they exported, to the inadequacy of supplies in other producing countries, and to the fact that we—as distinct from many other countries—allowed the price mechanism to stimulate agricultural production here, so as to bring forward sufficient supplies of grains, cotton, tobacco, fats and oils, and others for the countries in need.

Gradually, however, other countries—exporting as well as importing—have expanded their production. Supplies in the world have become more plentiful, and the foreign markets of many products have become buyers' markets.

Last year's agricultural production in the world as a whole was estimated at 15 percent above prewar. Production of cotton, wool, tobacco, rice, sugar, meat, animal fats, and citrus were at record levels. Production was high, though not at record levels, for wheat, potatoes, beans and peas, edible vegetable oils, and dairy products. Not only did excellent weather help former exporters recover their production but it also aided former importing countries' efforts to develop indigenous supplies of U.S.-type commodities either for domestic use or export. At the same time, importing countries that had built up reserves of food and raw materials after the Korean invasion reduced their inventories in 1952-53 and 1953-54.

Aggressive Selling by Foreign Competitors

Confronted with this situation many of the other agricultural exporting countries employed aggressive sales methods. In part they did this because they lacked facilities and financial strength to hold large stocks over prolonged periods. Quite a number of these countries have developed monopoly export organizations. Among them are practically all of our competitors in the world grain markets: Canada, Australia, Argentina, Turkey, and, of course, the Soviet bloc. Several of the exporting countries employ multiple currency practices. Examples are Argentina, Brazil, Egypt, Turkey, and Spain. Often, these multiple currency practices have, in effect, involved export subsidization of agricultural products. Other forms of direct or indirect export subsidies also have been widely used. Our agricultural trade missions, which, this spring, visited 35 countries, have noted that a number of agricultural exporting countries support prices at higher levels than the United States but "subsidize export sales to such an extent that their offering prices to importing countries are less than those of United States exporters who receive no subsidy or a smaller subsidy."

Under these conditions, United States price supports have operated as an umbrella over other exporting countries. A good example is cotton. Toward the end of the 1951-52 marketing year foreign countries accumulated surplus stocks. They were able to cut their prices by various means as underselling our cotton (the support of which was maintained) and to liquidate most of their surpluses. Our own exports dropped sharply and began to recover only after most of the surplus in foreign hands had been liquidated. Our own stocks increased from 2.8 million bales on August 1, 1952, to 9.5 million bales on August 1, 1954.

Improved Dollar Position of Our Foreign Buyers

The impact of the change in the competitive position of United States farm products has been offset to only a minor extent by the benefits obtained as a result of the improved balance-of-payments position of foreign countries.[4]

This improvement has been substantial. In 1953 alone, the gold and dollar reserves of the free world increased by $2.5 billion. On January 1, 1954, these reserves totalled $23 billion. Thus, they were 50 percent higher than on January 1, 1950. Foreign countries have been able to increase those reserves because of such factors as a much better balancing between United States imports and exports of goods and services, substantial United States foreign investments and gifts on private ac-

[4] "Changes in the dollar position abroad and their impact on United States Agricultural Exports." Foreign Agriculture Circular FATP-C 3-54, May 10, 1954.

count, and a continued high level of United States Government spending abroad. While United States foreign economic aid has been cut sharply, United States spending abroad (including expenditures for troops, military installations, and offshore procurement) has increased considerably in recent years. (Table 2). As a result, in 1953, foreign countries obtained $4.9 billion from U. S. Government sources (U. S. economic aid, Government expenditures abroad, and U. S. loans), compared with $4.7 billion in 1952, $5.1 billion in 1951, and $4.5 billion in 1950.

TABLE 2. UNITED STATES ECONOMIC AID, AND UNITED STATES GOVERNMENT EXPENDITURES ABROAD INCLUDING FOREIGN LOANS, 1950–1953

(In million dollars)

	1950	1951	1952	1953	Change 1950–53
I. Economic grant aid	3,483	3,035	1,960	1,813	−1,671
II. Government expenditures abroad and loans					
Military expenditures abroad	576	1,270	1,957	2,496	+1,920
Government imports of services, non-military	250	254	277	267	+17
Pensions and other transfers	79	71	128	140	+61
Net Government loans	156	156	420	220	+64
Total	1,061	2,068	2,782	3,123	+2,062
Total I and II above	4,545	5,103	4,742	4,936	+391

Source: U. S. Department of Commerce, Office of Business Economics, "Survey of Current Business," July 1954.

This change in United States Government expenditures abroad, from the disbursement of aid to large purchases of foreign goods and services, coincided with the improvement in the foreign supply position to which I referred previously. This coincidence has increased the tendency of some foreign countries that still rely extensively on exchange and import controls to shift from United States to non-United States sources of agricultural products. Foreign purchases of nonagricultural products declined less because many manufactures cannot be obtained abroad at equal prices in equal quality.

Most of the exchange and trade controls that foreign countries are maintaining are usually justified on balance-of-payments grounds. With the improvement of the financial position of the respective countries, they have, however, been forced to admit that many of these controls serve to assist domestic producers in the competition with foreign producers.

Import Restrictions Continue

Even where countries are deficit producers of a commodity, this assistance is maintained by continuing the restrictions on imports. As a matter

of fact, the principal European countries that recently have liberalized imports—the United Kingdom, Germany, Belgium, and the Netherlands—have, in general, excluded from such liberalization those agricultural products that are competitive with their own agricultural products. In particular, they continue to control, or even to embargo, most of the fruits and vegetables of the Temperate Zone that they, themselves, produce. Germany has not liberalized any of the products for which it has set up marketing boards, as for example grains. The United Kingdom has removed quantitative restrictions on grain imports, but it assures priority for its producers in the domestic market by paying them the difference between fixed support prices and market prices.

Exchange and import controls are being used also to secure for domestic producers—agricultural and even more industrial ones—preferential markets abroad. This use of controls is linked to bilateral and regional trade and payments arrangements.

To a varying extent, all of our agricultural export commodities find their competitive position abroad impaired by such practices. The markets for the horticultural products of Europe and the British Commonwealth have, by such means, been expanded greatly while United States horticultural products have been denied access to—or at least have been severely restricted in—the British and the continental European market. Imports of American grains are restricted by a number of countries not only in order to assure domestic producers of a market but also in order to make sure that grain imports from other countries reach the amounts set under bilateral arrangements. For a similar purpose, imports of United States cotton are being restricted by a number of European countries that do not themselves produce any cotton, and, at best, produce minor quantities in their dependencies. United States tobacco has found foreign markets curtailed by bilateral arrangements of various kinds.

Confronted with aggressive competition from other exporting countries and with restrictive, or even discriminatory policies of many importing countries, what is the outlook for our agricultural exports?

Economic Development and Agricultural Trade

In appraising this outlook, we must bear in mind that agricultural production will probably continue to increase, not only in this country but also in many foreign countries. For the world as a whole, it has been estimated that the rate of increase may be about 1½ times the rate of the population growth.

There is, of course, a tremendous need in the world for more and better food and clothing. It is sometimes suggested that, because of this need, there should be an indefinite continuation of giveaway programs on part of the United States. I strongly disagree with this. I believe that

the United States should not engage in giveaway schemes beyond assistance in acute emergency needs. And I believe that we would give a doubtful kind of help to other countries if we engaged in continuous giveaway operations. Let us not forget that in other countries, as well as in the United States, producers depend on the sale of their products for a living. Continued giveaway programs of the United States cannot but disturb their markets as well as ours. They would tend to create ill will against the United States.

Present surpluses, as well as increases in the world's agricultural output could be absorbed, however, if a balanced growth of the economies of the various countries, and especially of the economies of underdeveloped countries provides them with more income—more money income in the marketplace—to buy more of the food and clothing and other things they need.[5] Pushing agricultural output irrespective of the market situation will not bring lasting improvement. Economic development must, first of all, aim at the development of markets. This means that development of transportation, communication, industrialization and urbanization must go hand in hand with—and, to some extent, must even precede—the expansion of agricultural production in the underdeveloped countries.

Fortunately, more attention begins to be given to this need for balanced growth and for gearing it to an increase in consumer purchasing power and to market development. In particular, the agricultural trade missions have recommended an examination of our technical assistance and foreign aid programs from the following viewpoints:

"1. Do they contribute toward a policy of sound development, both agriculturally and industrially, in the countries where they are carried on?
"2. Are they suited to the economic potential of the countries?
"3. Do they contribute to the development of the production of commodities of which production is needed in the world?
"4. Do they contribute to the development of increased consumer purchasing power within the respective countries?
"5. To what extent can technical assistance in the marketing of their own products and in the exchange of goods with other nations contribute to a sound economy and the development of healthy trade?"

U. S. and Foreign Import Controls

From the viewpoint of the United States, and especially from that of American agriculture, it will also be important what future policies of foreign countries will be with respect to trade and exchange controls.

I have already pointed out that many countries use trade controls much

[5] A more detailed analysis of this subject is contained in a paper by E. deVries and O. Zaglits, "Capital Investment and its Effect on Agricultural Production and the Demand for Agricultural Products." (Presented at the World Population Conference, Rome, Italy, September 1954.)

more extensively than we to assist their producers, and that this has become more and more evident as their exchange position has improved. Like the United States, foreign countries have developed agricultural programs that, in some circumstances, need to be defended by import restrictions. I would like, however, to draw your attention to the fact that the much-talked-about U. S. agricultural import quotas have had only a very minor effect on the sale of foreign agricultural products in this country.

In 1938-39, the imports of all products now subject to quotas,[6] excluding sugar (which is a special case, as I will point out presently), amounted to $15.6 million or 3.2 percent of all agricultural imports that are directly competitive with U. S. farm products. (See Table 3) Then,

TABLE 3. IMPORT OF COMMODITIES CURRENTLY UNDER IMPORT QUOTAS

Commodity	1938–39	1949–50	1952–53
		1,000 dollars	
Wheat and flour[a]	113	2,073	2,369
Oats and, rye (including flour and meal)	354	27,250	64,576
Cotton	7,941	45,391[b]	38,451
Peanuts	162	2	0
Dairy products[c]	7,003	13,275	26,685
Total	15,573	87,991	132,081
Total supplementary imports	486,165	1,531,794	1,911,100
Percentage under quota	3.2%	5.7%	6.9%

[a] Except wheat unfit for human consumption and wheat and flour imported in bond for re-export.

[b] Cotton imports usually are less than the total quotas set. In 1949–50 they exceeded those in preceding and following years, largely because a change in the beginning of the quota year (accompanied by a supplementary quota for the interim period) which affected purchase patterns.

[c] Includes butter, dried whole milk, dried skimmed milk, dried cream, dried buttermilk, malted milk, cheddar cheese, Edam and Gouda cheese, Blue-mold cheese, and certain Italian type cheeses.

in 1948-49—that is, before quotas were imposed on certain types of cheeses—the imports of all products, other than sugar, that are now subject to quota limitations, amounted to $88 million. This was 5.7 percent of the imports of products directly competitive with U. S. farm products. In 1952-53, these imports amounted to $132 million, or 6.9 percent.

I have excluded the sugar quota system in this calculation, because this system benefits foreign producers. The market regulation made it possible to reduce our sugar tariff to a much lower level than would have

[6] For a few commodities two-level tariffs or fees are in effect. A lower rate applies to imports up to a certain quantity, and a higher rate for imports above that quantity. These quantities are sometimes called tariff or fee quotas. However, there are no quantitative limitations on imports of such commodities into the United States.

been permissive under the Trade Agreements Act, if the tariff alone had to be relied upon to prevent serious injury to the sugar producers here and in our territories. As a result of the quota system, foreign sugar producers are able to sell their sugar here at a "fair price" even if surpluses depress the world market price of sugar—as was the case when the first Sugar Act was passed and as is the case now again. In fact, foreign producers obtain at present in the United States 1.9 cents more per pound of sugar than in the world market. In the total, foreign sugar producers earn much more for what they sell here than they would in the absence of the quota system. At the same time, the sugar price paid by American consumers is among the lowest paid in any country.

We have limited recourse to controls to those cases where imports definitely threatened to injure seriously our agricultural programs, and we are allowing foreign producers to maintain a reasonable share of the U. S. market. Moreover, except for two countries—Cuba and the Philippines—with whom we have historically had preferential tariff arrangements, we have allowed all the countries of the free world equal access to our market.

While therefore our own quotas have on the whole had little restrictive effect on imports of foreign farm products into the United States, many of the controls imposed by foreign countries against U. S. products are sharply restrictive and discriminatory. In the case of quite a number of commodities, especially horticultural products, the foreign controls often amount to a virtual embargo. While controls have recently been eased on imports of U. S. cotton, grains, tobacco and certain other products in countries such as the United Kingdom, Germany, Belgium, and the Netherlands, in some other countries the impact of import controls on U. S. agricultural products have recently become more severe.

Equity in Import Controls

On the basis of our own behavior, equity would entitle us to expect countries with an improved exchange position—especially those of Western Europe—to liberalize substantially their trade and exchange controls. On the basis of equity, we could make the following claims regarding quantitative restrictions on imports.

1. No country should maintain import restrictions for selected commodities, except where necessary to protect their own agricultural programs or their own producers of the same, or a directly competitive, commodity from serious injury. (This would, among other things, mean removing restrictions on products which the country itself does not produce and removing restrictions during the part of the year in which the domestic product normally is not marketed.)
2. Where a country continues import restrictions, it should not restrict imports below a reasonable share of its market. (This would mean that the

embargoes at present maintained against certain U. S. products would have to be replaced by quotas which should be reasonable in view of our historic position in the market of that country.)

3. Where a country continues to restrict imports by quantitative controls, it should allow all exporting countries equal access to its markets within the set over-all quantitative limit. (This would mean that the widespread discrimination against the United States in the administration of import controls would have to come to an end.)

There are more problems regarding the foreign trade restrictions that impede our exports. I am mentioning all these three points only to demonstrate to you what we could clearly request on the basis of equity. May I add that I am in full agreement with the recommendation of the Agricultural Trade Missions that the General Agreements on Tariffs and Trade should be renegotiated as "needed to provide for equality of obligations among signatory countries."

Need for Currency Convertibility

As a parallel to more equitable policies with respect to import controls, convertibility of currencies should progressively be restored. This would help not only in the restoration of normal competitive conditions in international trade, but it would also enable the countries that now have inconvertible currencies to buy food and raw materials from the cheapest sources and to sell at competitive terms wherever they find a market. Thus, a return to convertibility is in the self-interest of those countries and not just a favor to the United States, as often is claimed.

Summing up what has been said about agricultural export prospects, it appears that, in view of the large unfilled needs abroad, an expansion of these exports will become possible if:

(1) The development policies of the various countries, as well as our own assistance programs, are effectively geared to the promotion of balanced growth, to increasing consumer purchasing power, and to letting production develop in accordance with market demands; and

(2) Excessive and discriminatory use of trade and exchange controls is curbed and convertibility is gradually restored.

A Long-Term Program for Market Development

Even if, by such means, a more favorable climate is being created for the sale of our products abroad, we will not gain bigger markets just by sitting and waiting. On the contrary, we will have to strive hard to develop these markets.

The Secretary of Agriculture has therefore decided to set up the Foreign Agricultural Service on a broad basis. Our most important task is the development of a *long-range program* for the expansion of our foreign agricultural markets.

In doing this, it will be essential to make maximum use of private

trading facilities. This is essential, not only because private traders in competition with each other will do the job more effectively than Government agencies, but also because the market gains secured through private trade will be more lasting.

Another essential feature of such a program must be competitive pricing. With world supplies ample and with the exchange position of many importing countries greatly improved, we cannot expect to maintain and expand export markets unless we offer our products at competitive prices and at competitive terms. In some cases, producers will be able to do this on their own. In others, present competitive conditions in international trade and the type of support program will require Government export payments, if we wish to maintain a fair share of the world market for our farm products. This will be necessary especially where other countries use monopoly trading, multiple exchange rates, or other artificial devices to enhance their export trade.

Thirdly, since governmental assistance by means of export credit or export credit insurance has become nearly a universal institution around the globe, we will have to supplement our private export financing by similar means. The Export-Import Bank has, in recent years, given valuable assistance in the exportation of some of our agricultural staples. We hope that, after its recent reorganization, it will further extend this assistance in close cooperation with the private banks.

Fourth, cooperative efforts of private groups and the Government should be directed toward intensive study of foreign markets and of consumer preferences, not only for the raw products that we export but also with respect to the end products made therefrom.

Fifth, similar cooperative efforts should be directed towards the buyers and users of our farm products to expand their sales with the help of modern promotional methods such as used in this country.

Sixth, as suggested by the Agricultural Trade Missions there is need for effective centralization of governmental responsibility and authority regarding the cooperation with and asistance to private traders in their efforts to sell abroad the products of American farms.

Time will, of course, be required to carry out such a long range program and to reap the full benefits therefrom.

Short-Run Surplus Disposal Measures

In the meantime, special efforts are needed to reduce the pressure of surpluses on the market and to offset the trading advantages that other exporting countries have derived from offering their products for soft currencies. The Congress has recognized this. Last year, it authorized a one-year program for the sale of agricultural surpluses against foreign currencies. Surplus export programs totaling $245 million are being

financed under that authority. This year, in Public Law 480, it has provided a new and broader basis for such a program. It has authorized expenditures up to $700 million for local-currency sales, and another $300 million for the use of surpluses to meet famine and other urgent relief requirements abroad. Both programs were authorized for a 3- year period beginning with the current fiscal year. The new law also facilitates the disposal of surpluses abroad through barter and in exchange for strategic materials or materials needed in connection with foreign economic or military aid or offshore construction programs. The Congress has also earmarked $350 million of FOA funds for the purchase of agricultural commodities.

The sales of agricultural surpluses for foreign currencies will be made on the basis of agreements with friendly countries (or organizations of friendly countries) that are interested in participating in such a program. The sales will be at prices that will not disrupt world prices. Assurance will be required from the participating countries that what they buy for their own currencies will be over and above their usual dollar purchases of our products. The law provides that the proceeds from foreign currency sales may be used for (1) development of new markets for U. S. agricultural commodities; (2) purchase of strategic and critical materials to establish a stockpile additional to, and supplemental to, the quantities acquired under the Strategic and Critical Materials Stockpile Act; (3) procurement of military equipment and defense materials, facilities, and services; (4) financing the purchase of goods and services for other friendly countries; (5) promotion of international economic development and trade; (6) payment of U. S. obligations abroad; (7) loans to promote multilateral trade and economic development; and (8) financing international educational exchange activities.

Steps have already been taken to make effective use of the new authority. It is, of course, too early at this time to give you details. But I can assure you that every effort will be made to use the new authority to stimulate and expand foreign trade in our agricultural products in accordance with the congressional intent, and, starting therefrom, to evolve a long-range trade development program along the lines outlined in the foregoing.

Summary

Neither in the short run nor in the long run, however, can we expect the foreign markets to absorb all our surpluses. As I noted in my opening remarks, the domestic market offers, on the whole, a much bigger outlet for the products of our farms. With our increasing population and our rising living standards, this market will continue to increase. If at the same time we succeed in expanding our agricultural exports, we should, within a period of some years, be able to work out of the present surplus problem.

APPENDIX I. AGRICULTURAL PRODUCTS IN FOREIGN TRADE

TABLE 1. AGRICULTURAL PRODUCTS IN UNITED STATES FOREIGN TRADE, 1953

(In million dollars)[a]

Item	Cash farm receipts[b]	Exports[c]	Imports[d]
A. Commodities commercially produced on United States farms or directly interchangeable with such commodities:			
1. Exports and imports relatively small	21,753	339	456
2. Exports substantially larger than imports	9,361	2,296	213
3. Imports substantially larger than exports	1,035	100	919
4. Imports directly interchangeable with United States produced commodities	—	24	202
5. Exports of food parcels and trade in minor items not classified above	—	72[d]	18
Total	32,149	2,830	1,808
B. Commodities not commercially produced on United States farms and not directly interchangeable therewith	—	14	2,374
Total all commodities	32,149	2,844	4,182

[a] Preliminary

[b] Continental United States only. Not including government payments. Cal. year 1952.

[c] Including trade of United States territories with foreign countries but excluding shipments between the continental United States and these territories. Trade data include all agricultural commodities, whether in raw or processed form. Cal. year 1953.

[d] Exports of food parcels totalled $49 million dollars.

Note: In this and later tables cash farm receipts are used as a means of indicating the importance of commodities for the American farmer. The value of cash farm receipts is not, however, directly comparable with the value of exports and imports, since the latter include all marketing costs, and, in the case of processed commodities, processing costs as well. The comparison is useful, however, to indicate relative magnitude of values.

TABLE 2. TRADE IN DOMESTICALLY PRODUCED COMMODITIES FOR WHICH THE VALUE OF EXPORTS AND IMPORTS IS UNDER 5 PERCENT OF CASH FARM RECEIPTS, 1953

(In million dollars)[a]

Commodity or commidity group	Cash farm receipts[b]	Exports[c]	Imports[c]
Cattle and other animals, meat and miscellaneous products	9,775	110	373
Dairy products	4,554	81	39
Poultry, eggs and products	3,444	32	3
Vegetables and preparations	1,882	71	53
Greenhouse and nursery products	596	5	15
Deciduous fruits, n.e.s.	467	21	10
Cottonseed	390	16	5
Hay and miscellaneous feeds and fodders	376	11	16
Peanuts	144	4	[d]
Berries	125	3	7
Total	21,753	339	456

[a] Preliminary.

[b] Continental United States only. Not including government payments. Cal. year 1952.

[c] Including trade of United States territories with foreign countries but excluding shipments between the continental United States and their territories. Trade data include all agricultural commodities, whether in raw or processed form.

[d] Less than $500,000.

TABLE 3. TRADE IN DOMESTICALLY PRODUCED COMMODITIES FOR WHICH THE VALUE OF EXPORTS IS MORE THAN 5 PERCENT OF CASH FARM RECEIPTS AND EXPORTS ARE SUBSTANTIALLY LARGER THAN IMPORTS, 1953

(In million dollars)[a]

Commodity group	Cash farm receipts[b]	Exports[c]	Imports[c]
Exports more than 20 percent of cash farm receipts:			
Wheat (including flour)	2,148	618	40
Cotton and linters	2,609	521	42
Tobacco	1,086	341	82
Corn	1,159	234	2
Lard, tallow and other animal fats and oils	450	130	1
Rice	301	154	2
Grain sorghums	97	19	0
Citrus fruit	258	55	4
Plums and prunes	50	12	4
Hops	24	10	5
Essential and distilled oils	14	7	1
Total	8,196	2,101	183
Exports 10 to 20 percent of cash farm receipts:			
Soybeans	778	134	2
Flaxseed	118	9	1
Dried peas and beans	145	28	3
Grapes, raisins, and wines	124	24	23[d]
Total	1,165	195	30
Grand total	9,361	2,296	213

[a] Preliminary.
[b] Continental United States only. Not including government payments. Cal. year 1952.
[c] Including trade of United States territories with foreign countries but excluding shipments between the continental United States and these territories. Trade data include all agricultural commodities, whether in raw or processed form.
[d] Imports appear high in comparison to exports because of the inclusion of wines and champagne in the imports; exports on the other hand consisted only of fruit.

TABLE 4. TRADE IN DOMESTICALLY PRODUCED COMMODITIES THE IMPORTS OF WHICH ARE MORE THAN 5 PERCENT OF CASH FARM RECEIPTS AND SUBSTANTIALLY LARGER THAN EXPORTS, 1953

(In million dollars)[a]

Commodity group	Cash farm receipts[b]	Exports[c]	Imports[c]
Sugar and molasses and related products	176[d]	21	470
Apparel wool	130	3	202
Oats	243	7	67
Barley and rye	200	29	78
Field and grass seeds	165	5	17
Edible tree nuts (domestic type)	85	6	7
Pineapple and miscellaneous fruits, and spices	11[e]	27	35
Tung nuts	10	[f]	5
Figs and dates	9	1	5
Olives	6	1	33
Total	1,035	100	919

TABLE 5. TRADE IN COMMODITIES THE IMPORTS OF WHICH ARE INTERCHANGEABLE WITH UNITED STATES PRODUCTS, 1953

(In million dollars)[a,b]

Commodity group	Exports[c]	Imports[c]
Oilseeds and products n.e.s.	21	146
Carnauba and other waxes	2	17
Edible tree nuts, (foreign type)	—	31
Vegetable fibers other than cotton	1	7
Total	24	202

[a] Preliminary.
[b] Including trade of United States territories with foreign countries but excluding shipments between the continental United States and these territories.
[c] Exports include mainly processed products based on imported raw materials or not identifiable as to origin.

TABLE 6. TRADE IN COMMODITIES NOT COMMERCIALLY PRODUCED IN THE UNITED STATES NOR DIRECTLY INTERCHANGEABLE THEREWITH, 1953

(In million dollars)[a]

Commodity Group	Exports[b]	Imports[b]
Coffee	7	1,465
Raw rubber	—	331
Cacao and products (cocoa, etc.)	3	185
Sisal, henequen, abaca, etc.	1	66
Carpet wool	—	93
Raw silk	—	26
Bananas and plantains	—	68
Spices		51
Tea	—	48
Drugs and herbs	3	27
Essential and distilled oils	—	13
Total	14	2,374

[a] Preliminary.
[b] Including trade of United States territories with foreign countries but excluding shipments between the continental United States and these territories.

[a] Preliminary.
[b] Continental United States only. Not including government payments. Cal. year 1952.
[c] Including trade of United States territories with foreign countries but excluding shipments between the continental United States and these territories. Trade data include all agricultural commodities, whether in raw or processed form.
[d] Total United States production, including that of United States territories, was valued at $500 million in 1952.
[e] Total United States production of pineapples in the territories was valued at approximately $100 million in 1952.
[f] Less than $100,000.

APPENDIX II.—U. S. AGRICULTURAL EXPORTS AND IMPORTS OF COMMODITIES PRODUCED DOMESTICALLY OR DIRECTLY INTERCHANGEABLE THEREWITH, 1951–1953

(Calendar Years)

Exports			Commodity Groups	Imports		
1951	1952	1953		1951	1952	1953
—1,000 dollars—				—1,000 dollars—		
1,468	1,483	1,058	Grains and preparations	131	166	169
1,146	874	521	Cotton and linters	42	40	42
326	246	341	Tobacco, unmfd.	85	81	82
214	147	130	Animal fats, oils and greases	1	2	1
118	140	143	Fruits and preparations	60	62	70
157	106	99	Vegetable oils, fats and waxes	108	96	93
97	84	124	Oilseeds	104	56	69
85	75	49	Vegetables and preparations	53	55	57
121	72	81	Dairy products	39	45	39
59	50	59	Meats and meat products	190	162	177
33	13	20	Feeds and fodders	42	75	41
32	21	21	Eggs and egg products	4	3	3
21	17	15	Sugar, molasses and syrups	439	472	470
13	19	37	Hides and skins	127	56	68
11	5	9	Nuts and preparations	58	49	55
9	11	13	Live animals, including cattle	63	18	29
[a]	[a]	3	Apparel wool and mohair	590	299	202
8	5	8	Seeds	21	21	18
13	11	12	Miscellaneous animal products	75	75	38
59	35	38	Miscellaneous vegetable products	86	69	93
39	8	49	Food parcels	—	—	—
4,029	3,422	2,830	TOTAL	2,318	1,902	1,806
11	9	14	Complementary Imports[b]	2,847	2,616	2,376
4,040	3,431	2,844	Total Agricultural Exports and Imports	5,166	4,518	4,182

[a] Less than $500.

[b] Imports of commodities not commercially produced in the U.S. nor directly interchangeable with such commodities. Exports consist of processed products made from such imported commodities.

Source: USDA, FAS, "Foreign Agricultural Trade," May 1953, July 1954.

APPENDIX III

SUMMARY OF PROCUREMENT AUTHORIZATION ISSUED BY FOA UNDER SECTION 550 OF THE MUTUAL SECURITY ACT ANNOUNCED THROUGH JULY 8, 1954

Country	—Approximation value in thousands of dollars—					
	Bread Grains	Cotton	Tobacco	Beef	Cotton Seed Oil	Lard
United Kingdom	—	—	20,000	17,250	11,000	8,000
Japan	43,000	—	—	—	—	—
Yugoslavia	22,800	4,800	—	—	—	3,997
Italy	—	15,000	1,500	—	—	—
France	—	12,000	3,850	—	—	—
West Germany	—	3,000	10,000	—	—	—
Spain	—	14,800	—	—	—	—
Formosa	6,985	—	100	—	—	—
Finland	—	2,000	3,000	—	—	—
Netherlands	—	—	—	—	4,000	—
Norway	560	—	—	—	—	—
Afghanistan	903	—	—	—	—	—
Israel	—	—	—	—	—	—
Total	74,248	51,600	38,450	17,250	15,000	11,997

Country	Barley	Butter	Prunes	Soy Beans	Fresh Oranges & Grapefruit & Canned Grapefruit Segments
United Kingdom	—	6,000	5,000	—	2,500
Japan	7,000	—	—	—	—
Yugoslavia	—	—	—	—	—
Italy	—	—	—	—	—
France	—	—	—	—	—
West Germany	—	—	—	2,000	—
Spain	—	—	—	—	—
Formosa	1,800	—	—	—	—
Finland	—	—	—	—	—
Netherlands	—	—	—	—	—
Norway	—	—	—	925	—
Afghanistan	—	—	—	—	—
Israel	—	—	—	—	—
Total	8,800	6,000	5,000	2,925	2,500

Country	Canned Apricot and Peaches	Tallow	Peanuts	Corn	Transportation	Country Total
United Kingdom	2,500	—	—	—	—	72,250
Japan	—	—	—	—	—	50,000
Yugoslavia	—	—	—	—	3,401	34,998
Italy	—	2,000	—	—	—	18,500
France	—	—	—	—	—	15,850
West Germany	—	—	—	—	—	15,000
Spain	—	—	—	—	—	14,800
Formosa	—	—	—	—	1,115	10,000
Finland	—	—	—	—	—	5,000
Netherlands	—	—	—	—	—	4,000
Norway	—	—	220	630	—	2,335
Afghanistan	—	—	—	—	312	1,215
Israel	—	—	1,200	—	—	1,200
Total	2,500	2,000	1,420	630	4,828	245,148

DISCUSSION

WILLIAM G. MURRAY
Iowa State College

Burmeister has presented an excellent statement dealing with our foreign trade in farm products. It is well organized and well supplied with up-to-date facts—the kind that answer pertinent questions which are likely to arise in this area. The tables which accompany the text deserve special commendation because they provide a valuable over-all statistical picture of our foreign trade situation in farm products.

A major portion of the paper deals with the significance of our farm exports including the present situation and the outlook for the future. In this I find little ground for disagreement or need for clarification.

Of special interest in the paper is the account of the market development group recently established by the Secretary of Agriculture and headed by Burmeister. Its most important task, according to Burmeister, is "the development of a *long-range program* for the expansion of our foreign agricultural markets."

This objective of expanding foreign markets for agricultural products raises an important question; namely, what farm products should be pushed in foreign markets. Before an attempt is made to analyze this problem in detail it seems appropriate to divide the question into short and long run phases.

In the short run there is no argument about the desirability of expanding our exports of farm products of which we have a surplus over and above domestic requirements including the requirements of a carry-over or stock-pile for national emergency purposes. Of course, if we continue to have surpluses over domestic requirements, foreign disposal of these surpluses would become a long run program. But it is reasonable to anticipate an eventual reduction of the surpluses so that they will not present a problem for the export market.

For the long run we should do some systematic analysis and estimating to determine which farm products should be pushed in foreign markets and which should not be pushed. The aggressive marketing plan to sell farm products, as outlined by Burmeister, has distinct merit if applied to those farm commodities in which we have and are likely to have a definite comparative advantage. But for those products in which our comparative advantages is disappearing or has disappeared, it would appear unwise to waste our resources in subsidizing or otherwise promoting sales abroad. In brief, we should concentrate our foreign sales expansion campaign for the long run on those farm commodities which have a strong competitive position in the world market.

In this long run foreign merchandizing program, the six features suggested by Burmeister impress me as the essentials of a splendid plan. It is encouraging to see such an intelligent forward looking approach being taken in the important task of selling farm products abroad.

FARM MANAGEMENT I

Chairman: Max Myers, South Dakota State College

FARM COST STRUCTURE AND OPPORTUNITIES FOR COST REDUCTION

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Agricultural Research Service

IN A subject as broad and complex as the farm cost structure and opportunities for cost reduction only certain aspects can be covered.

It is proposed in this paper to concentrate on the inter-relationship of cost structure and opportunities for *profitable* cost reduction in the decade ahead. The emphasis will be on agriculture as a whole rather than specific enterprises on individual farms, and the attention will focus on the effect of cost reduction on income and consequently the profitability from the standpoint of agriculture as a whole. The analysis will relate to *cost per unit* of output for all costs—cash and non-cash.

Present Issues in Cost Reduction in Agriculture

In the present situation of limited demands for agriculture products, a serious controversial issue is whether emphasis on cost reduction can increase income per farm family in the period ahead. Many feel price reductions accompanying increases in output will more than offset gains from the unit cost reduction. On the other hand, one of the major points of emphasis in the programs of the USDA, Agricultural Research Service and Extension Service is currently on cost reduction that will not greatly increase output, or will increase net income.[1] Analysis of the cost structure and cost-reducing opportunities from the standpoint of this issue would appear particularly timely now.

Differences in attitude toward effects of cost reduction on income depend to a considerable extent on differences in concepts. In a strictly static framework if we assume that cost reduction is output increasing, it follows logically that given inelastic demand for farm products, income reduction will generally more than offset the gains from cost reduction. But while this logic is perfectly straightforward, the assumptions may give a misleading answer as to the opportunities for cost reduction to increase income in the period ahead. We operate in a dynamic economy in which cost-reducing techniques will be adopted and output and demands will increase. Consequently, the *type* of cost reduction encouraged

* Helpful suggestions of fellow workers in PERB is acknowledged.

[1] Department of Agriculture Appropriations for 1955, Hearings before Subcommittee on appropriations, House of Representatives, 83rd Congress, 2nd Session. Part 2, pp. 259-60, 429-31, and 649.

can determine whether agriculture is better or worse off than it would have been without the encouragement. In this context the question becomes whether emphasis on cost reduction will maintain or increase incomes above the levels which would otherwise prevail in the period ahead. By the period ahead we mean 5 to 10 years from now. Significant changes in output and costs require such a period of years. Further, decisions are frequently made in terms of such a 5 to 10 year period.

Features of Cost Structure and Cost-Reducing Process in Relation to Cost-Reducing Opportunities

Features of the cost structure and the cost reduction process of major importance to the appraisal in this paper are as follows:

1. *The cost-reducing process generally has been output-increasing from the standpoint of agriculture as a whole, at least over the last generation.* Substitution of mechanical power for animal power is a notable example of a process that raised output *directly* through the release of cropland and pasture to production for market. Techniques which increased crop and livestock yields also directly added to the volume of output. Other cost-reducing techniques have sometimes increased total output *indirectly.* Use of labor-saving machinery on family farms, for example, may increase total output under conditions where the labor initially "saved" is used to add enterprises or farm more intensively.[2]

Not all cost reductions increase total farm output. Notably the sharp reduction in farm workers and farm operators since the war has probably not materially increased production. Further, the cost structure in relation to output-increasing aspects has changed. For example, it has been estimated that the shift from animal power to mechanical power accounted for one-half of the increase in the aggregate farm output in the inter-war period. Since 1940 it has accounted for a fourth.[3] This factor will be relatively insignificant in the period ahead.

2. *Semi-fixed inputs are an important part of total agricultural costs.*[4] Fixed or semi-fixed inputs are generally taken to include land and buildings, operator and family labor, and machinery. Altogether these constitute over 60 percent of all inputs.[5] The tendency in agriculture has been to make relatively full use of inputs of this sort. This is one of the

[2] Cost reduction techniques that are non-output-increasing for a large region may still add to the over-all volume of farm output for the country as a whole. A case in point would be the substitution of farm-grown hay and pasture for shipped-in feed grains on dairy farms in the Northeast.

[3] Unpublished data. Production Economics Research Branch, Agricultural Research Service, U. S. Department of Agriculture.

[4] For the sake of brevity, cost reductions from recapitalization of fixed inputs are not discussed in this paper.

[5] *Op. cit.* Unpublished data. PERB, ARS.

features which make it difficult to hold down volume of output in the shorter run.

3. *There have been important reductions in farm labor in recent years.* Total farm employment decreased by 17 percent from its postwar peak in 1947 to 1953—a 6-year period. Employment of family workers and hired workers was reduced 18 and 14 percent, respectively, during the same period. These data suggest that farm labor may not be as fixed in the shorter run as is commonly supposed.[6,7]

4. *The opportunity costs of farm labor have increased materially, especially during the last two decades.* This is documented in part by the fact that farm wage rates are now more than 4 times as high as in 1935-39. Wage rates of farm labor generally have risen faster than cost rates of other farm production inputs over the last 15-20 years. This has greatly increased the desirability of labor-saving techniques in agriculture.

5. *Nonfarm inputs have been increasingly substituted for farm labor and farm land.* Since 1940 nonfarm inputs—machinery, fertilizer and similar items—have increased more than three-fourths. They now represent over 40 percent of the total costs in agriculture.[8] This, in the context of fixed, and to some extent semi-fixed inputs, has constituted a built-in pressure for increases in output. Use of additional nonfarm inputs apparently still is highly profitable from the standpoint of many individual farmers.

6. *There is a wide variation among farms in costs per unit.* In a broad setting this is related in considerable part to the full use of labor and modern technology. Costs per unit of production on medium to large commercial farms, for example, are only about 40 percent of the costs on small-scale farms if operator and family labor is valued at hired wage rates in both cases.

Assumptions

In addition to these major features of the present cost structure, assumptions regarding the probable economic climate in the 5 to 10 years ahead are necessary to focus the appraisal of cost-reducing opportunities.

It is assumed that there will be a favorable economic climate. Continuation of relatively full employment in the economy would mean favorable conditions with respect to nonfarm job opportunities. It follows in part

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[6] However, the matter of divisibility of labor will be a basic problem here. An ample supply of nonfarm job opportunities, of course, was basic to this adjustment during the 1947-53 period.

[7] See D. G. Johnson, "Supply Function for Agricultural Products," *American Economic Review*, pp. 554-563, Vol. XL, No. 4, September, 1950 for elaboration of reasons for regarding labor as a variable input in periods of high employment.

[8] *Op. cit.* Unpublished data. PERB, ARS.

from this assumption that the relative cost of farm labor will continue high.

There will be some increase in over-all requirements for farm products. Upward trends in population and real income per capita are assumed. These would result in a material increase in the consumption of farm products. However, the current rate of production exceeds consumption. On balance, the level of farm output needed to meet annual requirements, say 7 years hence, might be 5 to 7 percent above the present output level.[9] This would represent an average increase in output of less than one percent per year. The postwar rate of increase in output has been about 1.7 percent. This compares with a 3.2 rate for the World War II period, 0.9 for the Thirties, and 1.2 for the Twenties.

Finally it is assumed that the conditions of demand will favor expansion in output of meat and poultry products. This would occur chiefly because of a relatively greater income elasticity of demand for these products.

Major Types of Cost Reduction

Relatively few farmers produce either on the most efficient cost curve or at the point of minimum cost under the rapidly changing conditions in which agriculture operates. Planning of the use of resources is commonly based on past price relations rather than the developing situation—partly because of difficulties in forecasting and partly because of the influence of habit. In many instances lack of mobility and funds will cause further lags in adjustment. In addition, continual development of new technologies brings about new opportunities for adjustment in agriculture in relatively short periods of time. The modern technology of today may be out of date tomorrow.

Adjustments that involve increases in *size* of farm are based on both price relations and technology. But, problems of mobility have a special relevance in this area.

The above factors suggest three broad methods of cost reduction: (1) factor and product substitution, (2) technological change, and (3) increase in size of farms. As will be noted later, these can operate individually, or as is often the case, jointly.

Prospective Substitution Possibilities

Opportunities to adjust to changed price relationships have been particularly important in the last few years. The war and postwar periods have seen great changes in the relative prices of various categories of in-

[9] This increase would be less than the increase in demand for food arising from population and income growth because of the present surplus production. In addition, stocks are now high and it is assumed that their disposal would take place outside regular market channels.

puts. Many adjustments have already been made. But changes in this area remain of importance because many farmers have not yet adjusted to the present price relationships.

Farm labor still represents over a third of the total cost in agriculture. Capital-labor substitution warrants serious consideration on many farms. Existing stocks of machinery are sufficient to permit further reduction in labor on other farms.

On larger farms, where considerable labor is hired, there is frequently considerable flexibility for substitution of machinery for labor. In this connection a recent study indicates that in production areas accounting for approximately one-fifth of U. S. farm production, at least a half of the farm labor was hired.[10] The increased use of cotton pickers, chemical and mechanical weed control, and silo unloaders represent a few examples of situations where considerable opportunities exist for further shifts to save labor on larger farms.

A difficult area for labor saving is found on the smaller farms because of the indivisible nature of labor resources. Frequently you cannot find alternative employment for a half a man. The great bulk of these farmers could effectively substitute machinery for labor if alternative employment was available. Off-farm work and custom operations by operators of these farms can make possible and profitable cost reduction in their farming operations. With proper planning, such shifts could be much more important in a full-employment economy than they have been, even in the last few years.

While the trend in nonfarm inputs has been upward and will continue in that direction, prospective conditions appear to favor some substitution of farm for nonfarm inputs. Examples of these would include use of green manure for fertilizer and legume hay for protein feed. They will be especially important as long as control programs are found necessary. In other situations significant savings may be achieved by shifts among nonfarm inputs.

The expansion of enterprises with lower cost per acre merits some special attention. In many cases it may be economically desirable during the next few years to shift from enterprises such as cotton or corn to enterprises such as hay or pasture. Shifts to lower cost enterprises may be particularly desirable on farms with older operators or those facing a reduction in family size or labor supply.

Balanced against these areas where prospective conditions favor cost reduction that may not materially increase output is an even larger area where prospective price relationships will encourage individual farmers to

[10] E. G. Strand, E. O. Heady, and J. A. Seagraves (Ms. in process of publication). Part-time and residential farms were omitted in estimating both production and labor.

add nonfarm inputs to present resources and directly increase aggregate output. These are the relatively simple types of adjustments that have been most common in the past. They include such things as increasing use of fertilizer, insecticides, better feeding of livestock, and improved seeds.

Technological Change and Cost-Reducing Opportunities

Changes in technology have been the chief basis for past reductions in real costs in both agriculture and industry. The crucial question regarding these changes in technology in the period ahead revolves around their probable effect on output and income.

The assumed increase in demand for several livestock products would seem to favor cost-reducing innovations in livestock, especially meat animals and poultry. Further, the more favorable price elasticities for livestock in comparison with, say, wheat can materially mitigate the over-all price effects of increased output if production shifts of this type are involved. Labor-saving innovations are especially called for in livestock production. It has lagged behind on this score in the past. Innovations on the horizon include such things as the self-feeding of silage, new types of machinery, and further developments in work simplification techniques. Cold wall tank milk storage and new arrangements in barns to permit labor efficient methods in feeding, milking, and handling of cows on dairy farms represents other developments that may offer substantial opportunities for savings.[11] New techniques that are primarily labor-saving offer good possibilities for increasing both efficiency and income, provided the associated necessary vocational adjustments can be worked out.

Capital-saving innovations may be expected to become of increasing importance. Important types of capital-saving innovations can provide a means of lowering costs without necessarily increasing volume of farm output. Savings in costs of fertilizer through more efficient placement is one possibility. New simplified land preparation and cultivating practices keyed to tractor operations represent another possibility for reduction in capital and labor costs. More efficient machinery and power units could play an important role.

Lower cost methods in building construction and renovation, and new techniques to reduce feed inputs per unit of output are examples of capital-saving innovations in livestock production. Savings in livestock housing costs may add little, if any, to total output. Improved feeding efficiency, however, would increase the output of agriculture.

Land-saving innovations have little direct relevance to livestock produc-

[11] In this connection see C. J. Fenjau and R. N. Van Arsdall "Meeting Dairy Market Sanitation Requirements Economically," Marketing Research Report No. 64, U.S.D.A., A.R.S., May, 1954.

tion. They are, however, important to livestock production indirectly via feed crops and pasture. New varieties, new development in pesticides, and similar yield-increasing innovations save land, but in the process frequently will directly add to volume of farm output.

Land-saving innovations, such as the use of supplemental irrigation on cotton in the humid areas, though profitable from the standpoint of the individual farmer, could, if widely adopted, greatly increase output and unfavorably effect total income of agriculture.

The greatest pressure to increase output in the shorter run is likely to come from land-saving innovations. The semi-fixed nature of the land input and the general prevalence of capital rationing in agriculture would support such a conclusion.

Size of Farms

Enlargement of commercial farms has been one of the principal avenues of cost reduction during the last 14 years of relatively full employment conditions. The estimated acreage per commercial farm increased a fourth from 1940 to 1950. The number of operators on commercial farms declined from 4.7 to 3.7 million.[12]

Stepping up this trend toward larger farms represents one of the most fruitful opportunities for cost reduction that will improve efficiency and income per worker in the decade ahead. Substantial reductions in unit costs are possible and increases in total output are likely to be relatively minor. Operators who enlarge their farms are likely to be benefited not only by decreased cost per unit but also, and frequently more important, by the increased volume of output per farm family. With farm enlargement they would be in a position to make fuller use of labor-saving techniques and avoid many of the problems of indivisibility of labor.

Opportunities for cost reduction through enlargement in farm size apparently are great both on small and large farms. However, cost reduction by consolidation of inadequate sized units has a double advantage of not only increasing net income to agriculture but also of improving its distribution.

How to stimulate thinking and interest of farm operators, particularly operators of small farms, in farm enlargement and development, the problem of availability and divisibility of land, and under what circumstances the necessary managerial capacities will be developed are all questions that point up some of the problems involved. Equally important are the problems of increasing the mobility of resources, particularly labor and capital.

[12] "Changes in Scale in Commercial Farming and Their Implications," Kenneth L. Bachman, *This Journal*, May, 1952.

Complex Changes

Reductions in cost are commonly achieved by the adoption of a bundle of practices rather than specific practices. The farmer who shifts from intensive crops to hay or pasture, for example, may also make improvements in the grasses grown and the amount of fertilizer applied on his pasture.

In some cases considerable emphasis on cost-reducing opportunities that materially increase total production may be desirable from the standpoint of agriculture as a whole. For example, the replacement of purchased dairy feed with home-grown pastures and hay in many of our dairy areas offers an opportunity for cost reduction to the dairy farmer which under some conditions might increase total welfare of agriculture by improved distribution of income. Perhaps even more important on this score is the encouragement of adjustments that result in cost reduction in low-production areas where present standards of living are extremely low.

The situation facing agriculture appears to be one of the proper combination of types of cost reductions available so that output rises with requirements rather than ahead of it. Cost-reducing adjustments under a favorable economic climate can be of a mixture that has less effect on total output than in the past. Whether these shifts could be sufficient in the decade ahead to improve net income in an absolute sense or simply to raise incomes above the level that otherwise would prevail is a matter of conjecture. In either event the challenge remains to give full emphasis to cost reduction profitable both to individual farmers and agriculture as a whole.

Because of the complex nature of many of these changes, farmers will have a more difficult planning job in capitalizing on such cost reduction opportunities. Less attention would need to be given to the simple cost reduction processes such as using more fertilizer or improved varieties. Much more attention would need to be given to cost reduction techniques that encourage recombination and substitution among inputs and products and hence are more complex in nature. The current emphasis of the Extension Service on farm planning can be an important means of encouraging costs reductions that have less effects on output insofar as it helps the farmer to think through these more difficult problems. More attention also needs to be given to stimulation of resource mobility and occupational adjustments.

Perhaps additional emphasis should be given to cost reduction in the production control programs. But many of the more desirable cost reduction opportunities from the standpoint of effect on total output represent rather complex changes and may be difficult to administer in an action program of the type we have had in the past.

Particularly in research, more attention needs to be given to the aggre-

gate effect on output of the different types of cost reduction processes. Analyses of this type can be highly important to research, extension, and action programs.

Summary

Continuation of relatively high employment and high wages in the U. S. economy represents a basic assumption in this analysis of cost reduction opportunities in agriculture. Under these conditions a wide variety of profitable cost reduction opportunities will face individual farmers. From the standpoint of farmers as a group, the crucial problem with respect to cost reductions in the decade ahead will be their effect on output.

In this context, the cost structure of agriculture has changed materially in the last two decades. Cost reductions achieved by shifting from horses and mules to mechanical power have been important in the past and have contributed greatly to increased output. In the future these shifts are likely to be relatively insignificant. The mobility of agricultural labor has increased materially with continued industrial prosperity. Nonfarm inputs now represent a major component of agricultural costs.

Opportunities for increasing yields and saving land are still great. The types of cost reduction actually made by farmers can materially affect the prosperity of agriculture and the need for production controls 5 to 10 years from now. Increased attention needs to be given by farmers and also research and extension workers to types of cost reduction that do not materially increase output and to cost reductions in enterprises with relatively favorable income and price elasticity. Especially important are those cost reductions achieved primarily by increasing the volume of output per worker. With increased size of business machinery and equipment costs per unit of output would be reduced. Even more important, with smaller returns per unit of output for the labor and management of the farm family total net income could be increased because of the enlarged volume. In agriculture, as in industry, increased volume with smaller margins appears to be the order of the day.

Such adjustments would require substantial re-combination of factors and the stepping-up of the present trend of shifting from agriculture to other occupations. In many situations individual farmers need outside assistance if these adjustments are to be made.

DISCUSSION

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This problem of decreasing costs in agriculture without decreasing income per worker is a complex one. It is complex in its technical relationships and in its political ramifications. Bachman and Barton have taken these two goals for cost reduction, namely increased efficiency and increased income per worker and developed a framework for reaching these goals. My remarks are directed mainly toward exploring alternative goals and evaluating possible eccomplishments.

Bachman and Barton have indicated three main areas of cost reduction; namely, (1) factor and product substitution, (2) technological advance and (3) increase in size of farms. I think we will have to admit at the outset that the possibilities of cost reduction are more plentiful in the area of increasing output than in areas that do not. Certainly such areas are more obvious. Of the three main areas of cost reduction, the shifting of workers out of agriculture and a resulting increase in farm size in terms of land resources offers the greatest opportunity for increasing real income of farm families. Unfortunately, to my knowledge, no one has found a very sure method of increasing mobility of farm families except by keeping the rest of the economy strong. Movement out of agriculture depends on opportunities in the rest of the economy. Perhaps more important, many families on inadequate size farms would be worse off in the city. Many of these workers have not developed the skills needed to obtain an adequate income from industry. They are perhaps not inclined to leave home. In many such cases the goals of the farm family will more nearly be met by staying in agriculture. In this respect part time farming may well be a healthy development. If the new extension program in Farm and Home Development could reach some of these families a real contribution would be made.

Adjustments which require a re-combination of factors or products within the framework of maximizing the attainment of the goals of the farm family may well result in a host of small but additive repercussions. The new extension Farm and Home Development Program may be output increasing to the extent that it is effective. I can visualize a possible marked increase in production from this approach in the Southeast and to a lesser extent for other areas of the country. On the other hand I can visualize a possible shift to less intensive farming in the wheat belt and in some other areas. The net effect will depend to a large extent on the nature of the goals of the farm families, with particular reference to relationships between desire for a high income versus more leisure time. The net effect of combinations of new technology and a series of complex changes in the farm organization cannot be easily assessed. Many small but additive savings of capital may be substantially output increasing where capital is severely rationed. Logic alone is not a sufficiently refined tool to assess with certainty the final outcome.

It may be that the marginal research dollar would bring higher returns in exploring the possibilities of reducing costs in the general areas which would not be greatly output increasing than from the current emphasis on plugging the ratholes in marketing. At the same time we need to be certain that research is well conceived and that possible accomplishments are adequately evaluated.

Secondary effects of cost reducing techniques are difficult to assess because they are tied so closely to the goals of farm families.

Now let's look at alternative goals for cost reduction in agriculture. Naturally the goals we use are laid down by our society. As a profession, however, we do have a responsibility to see that the alternatives and implications are understood. Resource allocators in research, extension and other agricultural programs have a very powerful impact on the nature and welfare of our future agriculture. It is important that the conflicts between efficiency and high agricultural income are clearly understood. I have a feeling that this is not now always true. I have a feeling that urban as well as farm groups think of experiment stations, extension and similar activities as for the benefit of farmers alone.

At the same time, there is no doubt in my mind that the benefit from new techniques increase the welfare of our society much more than they are a detriment to agriculture, as long as we provide an adequate approach to cushion the shock. Perhaps our society could reappraise its objectives, and reach a happy medium between efficiency and stability. Perhaps we could find a way to make up to farmers for the detrimental effect of reduced income from new technology and still leave society better off. Of course, the big problem here is to fit such a concept within our political climate. In any event agricultural sciences and education would benefit greatly from a more clearly expressed ordering of our society's goals.

IMPACT OF HIGHER EXPENSE RATIOS TO AGRICULTURE

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Federal Reserve Bank of Cleveland

THE net farm income of the nation's farmers last year as a proportion of gross income was the lowest in nearly twenty years.[1] Not since 1934 have farmers retained as net income a smaller percentage of the gross. Or, putting it the other way around, production expenses as a proportion of gross income has reached the highest point in about twenty years. Prices received and prices paid have fluctuated widely over the years, but attention should be given to the physical change in input and output in combination with these price relationships to explain why net farm income relative to gross farm income in 1953 was the lowest in nearly two decades.

The net farm income as percent of gross income of farm operators in the nation has declined rather steadily for more than ten years offsetting the net advance of the previous ten years (Chart 1). In 1942 more than 50 percent of gross farm income remained as net farm income. Because of the persistent rise of production expenses during subsequent years only

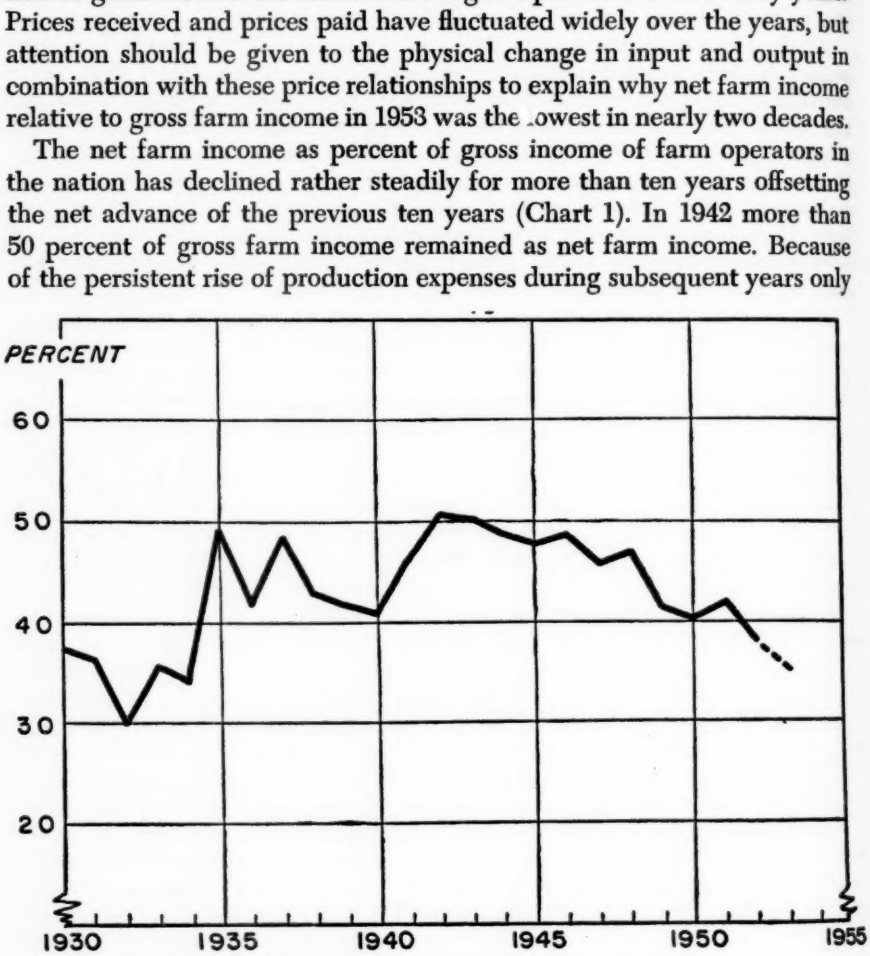


CHART 1.—NET INCOME AS PERCENT OF GROSS INCOME OF FARM OPERATORS (UNITED STATES), 1935-1953

[1] Net farm income of farm operators from farming including net change in farm inventories—amount available to cover operator's compensation for labor, management and capital invested.

35 percent of gross income remained as net in 1953. As a larger portion of the gross income has been required to meet production expenses it is obvious that the expense ratio has risen, and is currently about on a par with that of 1934, although still not quite to the previous high of 1932. The high of nearly twenty years ago, incidentally was only slightly above that of 1921.

The fact that gross income to the nation's farm operators this past year was over four times what it was in 1934 tends to obscure the current low ratio of net to gross farm income. The relatively high net income of this past year, as compared to such a year as 1934, can be attributed to marketings which were approximately double and prices which were nearly three times as high as in 1934.

A trend similar to that observed nationally in the ratio of net to gross farm income is revealed by data assembled from several different types of farms.[2] All of the major types of farms in Ohio, for example, have experienced the ten-year long shrinkage in the ratio of net to gross illustrated in the preceding chart. The differential among the three types of farms shown in Chart No. 2 has been relatively close the past three years.

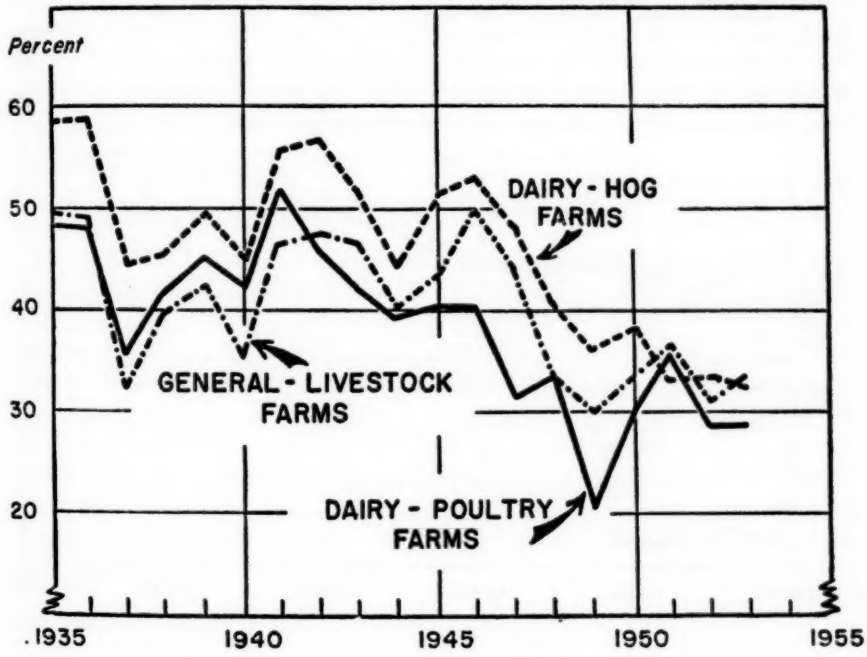
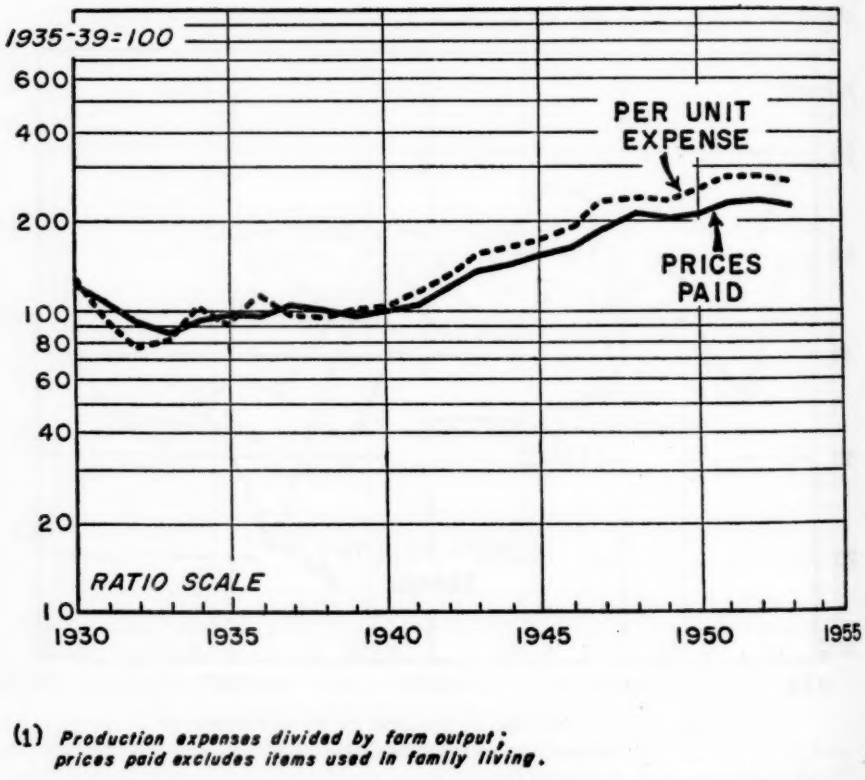


CHART 2.—NET INCOME AS PERCENT OF GROSS INCOME OF OHIO FARM OPERATORS, 1935-1953

[2] Ohio Farm Account Summaries—1935-1953, Agricultural Economics Department, Ohio State University.

In seeking an explanation as to why the ratio of net to gross farm income turned downward after the early forties, a period when output was expanding and prices received were advancing, it seems appropriate to note the change in production expenses in contrast to the change which occurred in farm output. In the period since 1942, for example, production expenses have increased 128 percent, whereas the expansion in farm output in the same period was 14 percent. Meanwhile the prices for items used in farm production rose 88 percent. It is apparent from the foregoing comparison that production expenses rose more proportionately than farm output. Furthermore, the rate of increase in production expenses apparently exceeded the rate of increase in prices paid for items used in farm production. If production expenses are adjusted for the rise in physical volume of farm output it is evident that there was a substantial increase in the expense per unit of farm output (Chart No. 3). This rise in per unit expense may in part explain why the ratio of net to gross farm income turned downward, or the expense ratio began rising about ten years ago.



(1) *Production expenses divided by farm output; prices paid excludes items used in family living.*

CHART 3.—PER UNIT EXPENSE COMPARED WITH PRICES PAID[1] (UNITED STATES)

Moreover, as shown in the chart the expense per unit of output rose at a more rapid rate than prices paid. Presumably the more rapid rate of increase in expense per unit can be attributed to an increase in the physical input relative to physical output over the period since 1942.

It is common knowledge among those associated with agriculture that farm operators during the past decade have purchased much more of the goods and services required in farm production than their predecessors. Under the impetus of rising prices and income in the early 1940's farmers generally adopted the findings of research more rapidly—some authorities say at an unprecedented rate, and added materially to their investment in mechanized equipment and other labor-saving devices to compensate for the exodus of farm workers attracted into war industries and those called in the armed forces. Each of these developments necessitated purchases of goods and services formerly farm produced, or performed by farm workers, and unquestionably had a significant influence on the quantity of purchased goods and services.

The decline in gross farm income from the postwar high of 1951 was accompanied by a slight contraction in production expenses in 1953. The contraction, however, was negligible in relation to the shrinkage in gross income. Unless production expenses can be adjusted to coincide more closely in time and amount with the present downward trend of gross income, it is probable that the expense ratio will move even closer to the high of 1932. What then are the impacts to agriculture of an expense ratio comparable to that experienced in the early 1930's.

Impacts of Higher Expense Ratios

In considering some of the impacts of a high expense ratio on agriculture it seems appropriate to think in terms of land, labor, capital and management—the four principal factors of the agricultural enterprise. The impact on one of these factors may well be reflected on one or more of the other factors. The addition of power and equipment to save labor, for example, has often lead subsequently to an enlargement of the farm business so as to permit distribution of the investment cost over a greater volume of output. Inasmuch as additions to the capital employed have exerted a dominant influence on the agricultural enterprise throughout much of the past decade the impact of a high expense ratio on capital might well be given first consideration.

Impact on Capital

The marked substitution of capital in the form of power, machinery and equipment for labor (and possibly to a lesser degree the substitution of capital in the form of soil amendments for land) in recent

years was associated with the rise in the expense ratio previously described The fact that the expense ratio in agriculture generally has risen over the past decade suggests that the increase in aggregate income was not in proportion to the greater dollar volume of capital goods being used.

Many farm operators found savings to be inadequate to meet operating capital requirements as it took more cash to meet production expenses. They, therefore, resorted to the use of borrowed funds. Non-real-estate loans, as a consequence, rose steadily after the war and reached an all-time high in mid-summer of 1952. Farm mortgage debt has also risen steadily from the postwar low of 1946 and at $7.7 billion January 1, 1954, it was 7 percent above a year earlier and the highest in twenty years. Some further expansion through the first quarter of this year was indicated in recent reports of the principal lenders.

During the past two years the expansion in farm mortage debt has been partially offset by a contraction in non-real-estate outstandings (exclusive of price support loans) but more recent data indicate that the rate of decline in short-term loans has become less pronounced than a year ago. The aggregate agricultural debt may, therefore, be approaching the relatively high level of the early thirties.

In relation to net income the present debt is admittedly less burdensome than it was in the 1930's. Nevertheless, with a high ratio of expenses to gross income the reserve to meet unexpected expenditures frequently proves inadequate. Earnings from the various phases of the farm business must prove to be almost precisely as planned or the ability to meet loan repayment schedules is impaired. When repayment schedules prove difficult to meet, then defaults, refinancing or conversions of short-term credit to longer term farm real estate loans become more common. Refinancing and conversions have increased in recent months but the number of cases generally is indicated by lenders to be of moderate proportions except in areas where prolonged drought or other local adversities have prevailed. Defaults so far have remained at unusually low levels.

On balance it can be said that a high expense ratio, while partly a consequence of greater capital use, is also a causal factor in increasing the operating capital requirements of agriculture. This in turn has led to a marked expansion in the use of borrowed funds. If the expense ratio continues to rise bringing a further contraction in net income a further impairment of ability to service debts is probable. On the other hand, if net incomes can be maintained by improving gross income or by lowering production costs the present debt burden may be resolved with less unfavorable influences on agriculture than occurred in some previous periods when the ratio of net to gross farm income was comparable to that of the present.

Impact on Land

In an effort to maintain income when the expense ratio is rising farm operators tend to expand output by cultivating more land or cultivating the same area more intensively. The acreage of the 52 principal crops grown, for example, was the largest of record in 1932, a year preceded by a three-year rise in the expense ratio. The recent rise in the expense ratio has not been accompanied by an appreciable change nationally in crop acreage. (The acreage of principal crops this year is about on a par with last year despite a reduction of 20 million acres in crops under allotments.) While there has been no significant change in the total acreage of crops on a national basis in the recent period, the aggregate amount of fertilizer applied has continued to increase representing more intensive cultivation of the area used.

The impact of an upward trend in the expense ratio on the use of land and capital is rather effectively illustrated by the experience of 35 Northeastern Ohio dairy-poultry farm operators in the period 1946 to 1953. The operators of those farms enhanced their gross income by 29 percent by milking a third more cows and cultivating a fourth more cropland the past two years than in the first two years of that period. The net farm income, or the amount accruing to cover labor, management and capital invested rose less than 8 percent. The total capital invested, incidentally, increased slightly more than 50 percent. In brief, despite a high gross, the operators of those farms actually received less compensation for labor and management on the average over the last two years than the first two years of the postwar period even though they milked a third more cows and cultivated a fourth more cropland with the same manpower.[3]

Impact on Labor

Farm wage rates rose much more, proportionately, during and following the war than the other goods and services used in farm production. The advance in wage rates, however, was insufficient to prevent large numbers of capable and experienced farm workers from being attracted into more lucrative off-farm employment. Farm operators as a consequence were forced to choose between depending upon the labor that could be obtained at prevailing rates or adding more power and equipment to compensate for the decline in number of workers. A majority chose the latter alternative with the result that farm mechanization was precipitately speeded up. The total component of power and machinery on farms was recently estimated by Department of Agriculture authorities to be nearly 75 percent greater than in 1941.

[3] Manpower was equivalent to 1.7 men employed full time.

This addition of power and equipment and the widespread adoption of technological improvements in agriculture (such as more liberal and better placement of fertilizers, soil and moisture conservation practices, hybrid seed, chemical weed control, antibiotics, production testing, and artificial insemination), permitted fewer workers to turn out a larger volume of output. The result was an increase in output per man hour of more than 35 percent over the past ten years. An increase in output per man hour of those proportions was a strong influence against a rise in the expense ratio. Nevertheless, the fact remains that the expense ratio has risen, suggesting that the advance in per unit cost outweighed the gains stemming from a higher output per man hour.

Impact on Management

Those in the position of managing a farm enterprise during a rise in the expense ratio have been required to think in terms of expanding gross farm income in order to maintain the net return. For some farm operators this has meant horizontal expansion in the form of more acres, more cows, or larger flocks and for others it has taken the form of vertical expansion, such as the production of a higher value product or preparing and possibly delivering the product directly to the ultimate consumer. In each instance, of course, the management skill must be adequate to meet the added responsibilities or the potential expansion in gross income is not forthcoming.

Those farm managers who have been most successful in meeting the problem of an upward trend in the expense ratio have attained a high degree of efficiency in the use of all four factors in agricultural enterprises, namely, land, labor, capital and management.

DISCUSSION

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Mississippi State College

Although breakeven point analysis has been used in industry upwards of thirty years, as far as I can ascertain it is a fairly new tool in Agricultural Economics. As is sometimes the case with tools developed for a particular job, adaptation is needed before the tool is applicable for a new job. Mr. Hummel has attempted to adapt breakeven point analysis to aid in determining the farmer's ability to service debts. However, in the process of adaptation, breakeven point analysis was left behind.

Hummel is on more familiar ground than I am with respect to the usefulness of the ratio of production expenses to gross farm income in determining the ability of farmers to service debts. Hence, I hesitate to question the usefulness of the ratio for this purpose. However, it seems that an average ratio for the

nation as a whole would have limited usefulness when applied to an individual farm. In addition, comparison of the ratio for two years such as 1953 and 1934 would not seem to me to tell us much with respect to the farmer's ability to service debts in the respective years. Total net farm income would seem to tell us more, and changes in the total often move in the opposite direction from changes in the ratio.

In the discussion of the impacts of higher expense ratios on land and labor, Hummel confuses me as to which is cause and which is effect. For example, in the discussion of the impact on wage rates it was pointed out that wage rates rose much more, proportionately, during and following the war than the other goods and services used in farm production and that this resulted in substitution of power and machinery for labor. Instead of being a result of higher expense ratios the hypothesis is offered that higher wage rates contributed to the higher expense ratio.

In the discussion of the impact on management it was stated that farm operators have been required to think in terms of expanding gross farm income in order to maintain the net return. It seems that thinking in terms of increasing efficiency, which would in turn lower production costs for the same output, would be at least equally or maybe more important.

To supplement Hummel's paper I would like to offer some of my own mental speculations as to the impact of higher breakeven points if the usual definition—the point at which all costs of production are exactly covered—is adhered to.

Any one or any combination of the following would change the breakeven point.

1. Changes in product prices.
2. Changes in factor prices.
3. Changes in production techniques, including changes in resource productivity.

For the individual farm operator, higher breakeven points resulting from changes in product and factor prices would naturally be accompanied by lower net farm income, unless the price changes were offset by changes in production. Impacts of higher breakeven points arising in this manner would then be, among others, those which could be enumerated for lower net farm income.

For the individual farm operator, higher breakeven points resulting from changes in production techniques such as the substitution of power and equipment for labor would appear to either increase net farm income at the time the substitution is made, or to reduce the drudgery of farm life. Otherwise, the farm operator making the substitution would not be a very prudent businessman. Impacts of higher breakeven points arising in this manner would then be among others those which could be enumerated for higher net farm income.

Higher breakeven points for the individual farm operator can either be associated with higher net farm incomes or lower net farm incomes. If we think in terms of agriculture as a whole, higher breakeven points for individual farms are not inconsistent with a lower breakeven point for agriculture as a whole. Total costs of production for agriculture as a whole may be reduced by reorganization of resources so that there would be fewer farms with the breakeven points for each farm higher than before the reorganization. It is no wonder, then, that we are hard put to point out the impacts of higher breakeven points on agriculture. Considering the fact that the underlying reasons for higher breakeven points have to be brought out before the impacts can be discussed,

I would like to raise a question as to the general applicability of breakeven point analysis in farm management. Let me hasten to add, however, before I am mobbed by the proponents of this type of analysis, that I am not questioning its applicability in industry. Neither am I questioning its usefulness in farm management before capital is committed to a specific form. It could be very useful to an individual who is contemplating the purchase of a farm. Knowledge of how many bales of cotton, bushels of corn, or bushels of wheat that would be required at his anticipated prices to cover all costs of production, together with some idea of the productivity of the farm, could be of great value in arriving at a wise decision as to whether to purchase the farm at the price asked.

After capital has been committed to specific forms, however, there is little or no use for this type of analysis in farm management. The farm operator has under his control certain factors of production which are fixed. To these fixed factors he adds variable factors in proportion and amount which seem optimum to him under his unique circumstances, and hopes for cooperation from Mother Nature. The breakeven point would seem to me to be only a signpost along the road he wishes to travel. As long as our farm operators have cash-register consciences they are not interested in whether they will break even at 2,000 bushels of corn or 3,000 bushels. Their interest is in whether they would be better off, all things considered, to try to produce 4,000 bushels or 4,500 bushels from the fixed factors under their control.

When several products are produced on the same farm and a large proportion of the total capital is already committed to specific forms, matters for the breakeven point type of analysis for the farm as a whole is further complicated. There would always be an infinite number of combinations of the several products which could represent the breakeven point, and only Mother Nature knows which combination will actually be realized.

CRITICAL PROBLEMS OF YOUNG FAMILIES IN GETTING ESTABLISHED IN FARMING

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University of Kentucky

THE subject, "Critical Problems of Young Families in Getting Established in Farming," is a most timely one. It is, however, rendered somewhat difficult because of the width of meanings of its component terms. The terms, critical, problems, getting and established, as well as the term farming itself have wide boundaries of meaning and application. In addition, both *getting* and *established* are processes involving time dimensions. These difficulties can be partially resolved, I hope, by somewhat arbitrary definitions which will be attempted later. First, may we take a look at the scope of the over-all problem itself.

Scope of the Establishment Problem

What is the point of interest for agricultural economists in young families becoming established in farming? Surely there will be enough farmers. Probably there will continue to be "too many" in relation to markets, to land resources, and to individual access to working capital. Little doubt exists that farms will be operated. Perhaps the point is that economists have exhibited an interest in good farming and good living of farm people, in the industries output, efficient production, in equality of opportunity to individuals, and in keeping the avenues of competition open. We want to see opportunity for individuals to *climb* some kind of an agricultural ladder, traditional or new. We are thus interested in sponsoring actions that will help enable the best qualified and most intensely interested individuals to gain entrance and that such numbers of both tenants and owners enter as will encourage development of sizes of business that will provide a good level of living. Obviously the number that can attain these objectives out of the present farm product market—plus unearned increments and windfall profits—is smaller than the numbers now engaged. Farming is the most desired of all business enterprises. In addition to the millions of young men who are reared on farms, most of whom would likely enter farming if they could easily or immediately gain command of adequate capital investment, there are thousands of city reared people entering the business.

Intentions of farming are usual expressions of students in agricultural colleges, 4-H Club members, Future Farmers and G. I. Trainees. Of 69 students (3 classes in Agricultural Economics) at the University of Kentucky, 63 expressed an expectation of entering farming within 10 years. Of this 63, thirty-four can inherit entrance as soon as external conditions, such as military service, permits. By contrast, only 16 of the parents of

these 34 boys entered farming through inheritance. Another survey of 255 farmers[1] indicates that 141 owners either inherited their farms or paid for them largely—(75 percent or more) from income outside of farming. Census figures, though always subject to definition, may serve a useful purpose at this point. The 1950 census gives a total of 5,044,000 farm operators reporting age. Of this number, 745 thousand were 65 years of age or older. In 1900 it was 595 thousand. Changes in the relative numbers within the age groups throw some light upon the magnitude of the problem under discussion. The number of operators under 35 decreased by *40* percent from 1900 to 1950 while the total number decreased by only *10.5* percent. The number over 64 years of age increased by 25 percent. This trend indicates, among other things, some increased difficulty in entering farming—or at least some increase in the comparative advantages of entering other vocations, and an increased activity age of operators beyond 55 years. A breakdown into tenants and owners indicates similar trends for both groups with somewhat less increases for the tenants in the over 54 age groups.

TABLE 1. AGE DISTRIBUTION OF FARM OPERATORS 1950 AND 1900

		Total	Under 25	25–34	35–44	45–54	55–64	65 & Over
		000	000	000	000	000	000	000
Operators Reporting Age	1950	5,044	164	791	1,187	1,157	1,000	745
Operators Reporting Age	1900	5,635	275	1,194	1,410	1,296	867	595
Full Owners	1950	2,905	32	292	592	696	699	593
Full Owners	1900	3,631	76	541	908	916	683	505
All Tenants	1950	1,323	117	372	363	242	227	
All Tenants	1900	2,004	198	653	425	286	222	

If 25 to 70 may be used as the activity span of entrepreneurship in farming, we are currently using an average of some 120 thousand entrants per year, or an average of some 40 per county per year. A study made by Dr. John Bondurant of the University of Kentucky revealed the shorter time of 33 years as the activity span.

Entrants as Owners

Probably around 75,000 owner operators have been entering farming per year. If one-fourth to one-third of these enter through avenues other than inheritance, some 18 to 25 thousand gain admission and final establishment each year, through other avenues.

[1] Farms adjoining home farms of students.

This rate has likely been greatly exceeded since 1945 due to the "on the job" training programs for veterans with compensation. Perhaps the most critical situations of getting established are encountered by this group without some inheritance aid.

Thirteen studies compiled by Gibson and Walrath[2] covering the period 1919 to 1944 show a variation of from 11 percent of the farms in a study of Kansas acquired wholly through inheritance to more than 50 percent in Kentucky receiving all or some inheritance. The North Central Research Committee[3] estimate that as high as 80 percent of all beginning farmers enjoy substantial family assistance in entering at the present time. Evidently, smaller families on some farms, enlarged opportunities for urban employment, a longer life span of operators, and increased knowledge contribute to entrance through father-son arrangements. The Gibson and Walrath study indicates that as age of statehood increases, percent of inheritance increases. This trend is logical and again as technology increases the relative number of farmers needed decreases. Thus, a problem for the industry and the educators centers around both encouragement and discouragement of prospective entrants, or in helping young people analyze their respective comparative advantages for good farming and farm living.

Analysis of Problems

Let us now direct our attention to formulating some definitions for the terms composing the subject. In formulating these definitions the speaker has attempted to use common acceptance, that is general usage as departure points. Problems are situations or conditions calling for solutions. Problems lie in between the arising of situations at one extreme and solution or adjustment at the other. If no solution is possible or is even considered impossible by an individual, the problem disappears, i.e., "given up as a bad job." If, through management, what may have been a problem is avoided, that specific problem never came into existence. Problems are personal to individuals and collective only in the sense that similar problems or types of problems may be encountered by many individuals.

For further clarifying, let us divide problems into:

(1.) ordinary problems, (2.) severe problems, and (3.) critical problems. *Critical* may be defined as involving considerable risk—enough risk that some families, say 25 percent, would not survive if subjected to them. *Severe* problems could be defined as those which have not reached the critical stage for the family concerned. An attempt will be made to describe

[2] W. L. Gibson and Arthur J. Walrath, "Inheritance of Family Property," *This Journal*, Vol. XXIX, November, 1947.

[3] Report of North Central Land Tenure Research Workshop—August 24-September 2, 1953.

some of the *severe* problems which may be encountered by families later. *Ordinary* problems may be defined as the usual day to day situations, rather certain to be encountered and which ordinary experience and the usual levels of management can handle. Ordinary, severe, and critical describe degrees of risk, and difficulty in solution or avoidance. Frequently, one, two or more serious problems hit simultaneously and gather into a critical situation. An ordinary problem on top of one or two serious problems may be, and frequently is, "the straw that broke the camel's back." One thesis then is that, critical problems are compositions of ordinary and severe problems.

What is Established?

Full establishment in farming is a process of a continuing nature. Few families, relatively speaking, are ever completely or ideally established since optimum combinations of the fixed factors are in constant change, and because of life cycle associations. Establishment is thus a matter of degree. A subgroup of the North Central Land Tenure Research Committee, led by Dr. Franklin Reiss, in studying the problem under general discussion has accepted the following definition for *established* when related to young families.[4] The family must have: (1) Completed one year in the status of operator or two years as joint operator, with assurance of continuing in this status for at least another year. (2) Attained a net worth equal to or exceeding one-third of the average tenant's investment on similar family-type farms with enough machinery and equipment to permit efficient operation. (3) Operate on a scale, which under average management, is capable of producing a net income large enough to provide a satisfactory minimum level of living and a satisfactory rate of capital accumulation, and which is large enough to preclude more than 100 days of operation's labor in nonfarm or off-farm employment. This definition is a good statement and serves to describe an approximate lower limit or minimum of being established as far as management, physical equipment and tenure are involved. This lower extreme is somewhat more than started at farming, but obviously still within the status readily subject to critical situations. The writer encountered no problems which would generally be classed as serious in getting started in farming in 1920, but ran into 20 years of critical situations, any one of which could have become diastrous with one additional happening such as the local bank closing, the death of a personal financial backer, a major hospital bill, marital difficulties, or failure to secure off-farm employment. In fact, the speaker was not firmly established in farming during the entire 20 years. A Kentucky study, made by Dr.

[4] Report of North Central Land Tenure Research Workshop, Camp Rabideau, Blackduck, Minnesota, August 24-September 2, 1953.

John H. Bondurant and James E. Criswell (portion of the N.C.L.T.R. Project)[5] of families deemed securely established, indicates that the process requires some 10 to 20 years to become firmly established including what was considered occupational security.

Though no limitation on level of establisment is specified in the subject given this speaker, history of the values held by this group implies that it wants to see farm families established on levels at least equal to those defined by the North Central Committee, i.e., in a business of such type and size as to hold promise of producing financial stability and a level of living commensurate with accepted standards of the agriculture's educational workers.

Some Severe Problems

Let us now take a look at some of the more frequent problems which may have serious or critical implications. Problems spring from three sources: (1) within the business, (2) within the family, and (3) from external and industrial happenings. The very nature of farm production coupled with the nature or life cycles of farm families provides a fertile environment for financial difficulties. If adverse external conditions such as drops in the general price level are assumed to occur critical situations are rather certain to envelop those with low net worths. Farm families in the 25 to 45 age group who are privately financing farm business characterized by their meagre capital turnover are frequently in vulnerable positions.

Ordinary and serious problems are usually the components of critical situations. Since problems vary in degree, intensity and timing, that condition such as an emergency surgical operation or an automobile wreck may turn out to constitute an ordinary problem to one family but a critical situation to another. Following are some of the problems likely to prove critical.

Price Cycle Problems

In 1924, Drs. Warren and Pearson wrote,[6] "Some farmers . . . were born at the wrong time." The subsequent 16 years added weight to the validity of their observation. Young families entering farming, and many others thought to be securely established, encountered one severe problem upon another, their survivals held in balance from day to day by slender margins of health, domestic loyalties, credit extensions, and debt moratoriums. Many did not survive. By contrast, most families entering farming in late 1930 or 1940 soon paid for their farms. Many paid for several farms.

[5] Unpublished preliminary report. University of Kentucky.

[6] G. F. Warren and F. A. Pearson, *The Agricultural Situation*, John Wiley and Sons, 1924.

Thus, a critical situation may develop from acquiring high priced fixed resources followed by sale of low priced products.

Inheritance Transfers[7]

Entrance through inheritance is not free of serious problems. Inheritance usually comes slowly, frequently tying the family to uneconomic use of resources and developing strained inter-family loyalties. In extreme cases this uncertain situation may continue, frequently worsening as time progresses for 30 to 40 years. Accompanying problems are fear and insecurity for parents and deterioration of physical properties.

Life Cycle Problems

The concentration of farm business and family expansions constitutes a serious problem situation for both inheritors and noninheritors. This concentration has its basis in personal financing, child bearing, and debt retirement pushing against a low rate of capital turnover. The young family is confronted simultaneously with:

1. Costs of establishing and furnishing a home
2. Costs of pregnancy and childbirth
3. Costs of rearing children
4. Acquirement of farm operating equipment
5. Additional costs for livestock farming
6. Heavy interest payments
7. Initial installments on debt retirement
8. Sometimes retirement of previous debts
9. Extra insurance against risk, health and accident.

These problems are both financial and personal. A heavy physical strain is placed upon both the young wife and the young husband. Usually the wife is transferred from productive employment to the position of a consumer. Additional household help and related services may be necessary. These conditions typically concentrate within the 25 to 45 age period after which both loads simultaneously lighten. Educators have great opportunity to render service within this area by imparting general knowledge, and teaching management principles, including principles of capital accumulation.

Credit

A closely associated problem lies within the field of using credit. Credit is extended to farmers with relative difficulty and is generally considered not equal to the credit enjoyed by urban businesses and urban employees. Urban businesses using the corporate method of financing

[7] See Gibson and Walrath—*op. cit.*

long-run fixed costs and the larger part of resources for variable inputs, have access to bonds, credit on bills of sale and invoices, installment financing, and discounts not readily available to farmers because of the nature of farm business, especially its rate of capital turnover. From the point of personal credit, it is perhaps singular that a G.I. can borrow, say, $12,000 for a city home—a consumer item—with little equity, easier than he can borrow for a $12,000 farm including a house. The Farmers Home Administration renders a noteworthy exception, but its available funds and restrictions have limited the number who can secure their plan of financing entrance into farming. Dr. Robert F. Hutton,[8] Agricultural Economist, T.V.A., thinks that there are enough credit agencies in existence to provide adequate credit and terms of credit if their credit policies were somewhat modified. Consensus of opinion indicates however that credit to farmers is not entirely adequate to individuals.

There is an important industrial point of view to the credit picture. If adequate credit, say 50 to 100 thousand dollars, were made available to all qualified young families interested in farming (or any other business venture) the number applying would doubtless greatly exceed the number needed (to produce current supplies). The inavailability of full credit to all who might desire it has many long-run advantages. The credit problem is somewhat one of balancing number of entrants needed for the industrial and national good as well as the individual good against the amount and terms made available to individuals. On the other hand, there is no particularly good purpose served by allowing entrants to fail because of some short-run problem outside of their control.

Large Capital Investments

Perhaps the most mentioned problem is that of the large investments needed for private financing of economic units. This area of problems arises out of inflated dollars, inflow of urban money, the competitive necessity of high cost working capital and higher investments for the home and the family. Outside investors have invaded farming, particularly within the areas of excellent lands, to the point of pushing land prices beyond their competitive capacity to produce good-level farm living and debt retirement even at present product prices. Income tax payments exert a double hardship on young entrants through raising land prices, and through drawing off some of the family's income.

Economies to scale is another cause for high capital investments. These economies of "large" scale have pushed the traditional economic unit far beyond the size of it in the horse drawn era.

[8] "Credit Needs for Modern Farming," an unpublished paper delivered to the Third Agricultural Credit Conference of the Kentucky Bankers Association, April, 1953.

Production Allotments

Production allotments and marketing quotas have not helped young farmers. In some respects we can say that they have tended to pass some farm problems on from father to son. Though the argument is a type of an egg-hen discussion, or macro-versus micro—and around to macro again; allotments have restricted acreage available to farmers, and have tended to limit the renting of farms and of crops. They have been a big contributing factor toward increasing land values. In addition to making farms higher in price, there are fewer to rent. If a young farmer could secure a 10-acre burley allotment even at a modest price, of say, $10,000, he would be well on his way toward physical establishment in farming. Allotments, marketing quotas and cross-farm compliance are restrictions in the nature of franchises. These do not help entrance.

Knowledge and Management Problems

Perhaps this listing is sufficient to indicate composition and interrelations of establishment problems. There is another area, however, that has both problem and problem solution aspects. Knowledge and management differ from other problem areas because their possession is a means of solution and their absence is a cause of difficulty. Again they differ in that they are strictly personal or within the control of the individual. They are resources in farming that may be secured before commitment to use. Knowledge, together with management, maneuvers conditions and times actions so that fewer problems arise. If one possessed perfect knowledge, critical problems and problem situations could be avoided. Though knowledge can never be perfect, it is a principal weapon in getting established. Transmission of facts, of processes of thinking, and of procedures of analysis may be our best methods of attack on internal problems.

In the absence of complete knowledge, farmers may learn to use management. Management broadly defined is a personal intangible process of attack on problems. It is made up of the personal qualities we call attitudes, determination, self-discipline, will power, ambition, mental strength, aggressiveness and the like. Its residence is *in* man. It gets into the man through training. As with knowledge, it is not physically transferable because it is a disciplined thought process. It includes or functions through five steps:[9]

1. *Observing.* Observing both the usual and unusual. Observing the processes of the successful and the drifting of the failures. I am increasingly chagrinned with the large number of individuals within a generation who make the same obvious mistakes the preceding generation

[9] L. A. Bradford and Glenn L. Johnson, *Farm Management Analysis,* John Wiley and Sons, 1953.

made. Correctly observing is the first step in avoiding problems.

2. The second inclusion of management is *analysis*. Tying facts together, relating them to personal and economic conditions, gathering additional observations, asking questions and a calculation of the odds or chances.

3. The third inclusion is *decision-making*. The formulation of judgment, the "making up of one's mind." Determination to act; usually a positive action but if negative, a determined one; not a default.

4. The fourth is action and the expression of the determination to act.

5. The fifth is acceptance of responsibility of results. Knowledge of how successful managers make decisions and accept results is helpful to young people. Their early training is frequently directed toward censure for mistakes. They should have some training on how successful managers make mistakes and accept them as a part of the managerial process.

Management is closely associated with learning or rate of learning. Where complete knowledge ends, management begins. To the extent that one has knowledge, i.e., is able to evaluate, judge and decide correctly, he can avoid the usual problems from coming in such magnitude and frequency as to keep critical situations from arising. If he knows his managerial capacity as a chance taker and his ability as a loser, he can better equate risk situations with his ability. Obviously it is not possible for young families to view the general run of life's problems from the vantage point of maturity. Many can, however, with our assistance, observe and analyze patterns of actions of families preceding them and thereby avoid some of the critical situations or problems caused by obvious mismanagement.

Research, teaching, and the Extension Service have rendered valuable contributions to the field of knowledge in getting established through the development of father-son farming agreements, guides and suggestions on property transfers. Further work is needed in developing guides for landlord-tenant agreements for young tenant farmers. Something in the form of internships or apprenticeships is needed. Schools are training thousands of farm reared boys in modern production practices who could become superior farm managers and tenant operators. They need but experience an additional year or two of management under supervisory managers. Landlords and potential landlords are constantly looking for men educated in agricultural economics and the technical physical sciences, but are reluctant to turn sizable farm businesses over to those without experience or to those reared outside of their personal contacts.

Domestic Relations and Health

There are two problems the speaker is inclined to rate as critical though unaccompanied simultaneously by other problems. These are family loyalties and health or accident. The speaker regrets that he finds no reference to these problems in the Bozeman Workshop report of The

Research Conference on Risk and Uncertainty in Agriculture.[10] Close interrelationship of the firm and household is a truism among agricultural economists. The selection of a spouse involves both risk and uncertainty by any definition of the terms. It is likewise, an area in which Management can play a big part. Therefore the speaker was surprised that it was omitted from consideration. Though the divorce rate is perhaps much lower among farm families than among urban families, husband-wife teamwork is not always perfect. Near perfection is almost mandatory for successful establishments through the noninheritance and low inheritance routes. How many times have we heard a successful farmer say, "All that we have I owe to my good wife." The first rung[11] of the new agricultural ladder for a young farmer is the development of a good reputation for himself and his family. A reputation based upon punctuality, honesty, complete sobriety, evidences of thrift and family harmony.

The other critical problem is in the areas of health and accident, against which there is opportunity for little formal insurance. The accident rate on farms is high and we need policies with large coverage for serious accidents including, perhaps, first cost deductions.

Attention has been centered largely on those problems within the managerial framework of the individual, leaving the industrial and national problems affecting all farmers to other speakers.

Summary

The thesis and summary of this paper is: (1) That critical situations are largely compositions of ordinary and serious problems. (2) That the nature of farming together with private financing, and the life cycle problems (biological in form), produces a trying environment for young farm families heavy in debt. (3) That many of the problems encountered by young farm families, can be avoided by the use of management, when related to both farm and family. (4) That educators, and others are rendering substantial aid in solving these internal problems. (5) That there is yet possibilities of improving the external climate in which all farmers operate.

[10] Proceedings, Research Conference on Risk and Uncertainty in Agriculture, Bozeman, Montana, August 10-15, 1953.

[11] L. A. Bradford and Glenn L. Johnson, *Farm Management Analysis*. John Wiley and Sons, 1953.

DISCUSSION

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As I read this excellent paper by Prof. Bradford I found myself admiring his choice of furniture (some of it was my own handiwork), but disagreeing in places with the architecture of the house in which he has placed it.

Let me supplement briefly some of Bradford's statements with preliminary results from an Illinois study before discussing a framework in which the problems of beginning farmers may be analyzed. Incidentally Bradford's estimate of 120,000 replacements needed annually seems too low. That is a rate of only 2.38 percent of the number of farm operators reporting their age. Estimates by rural sociologists have been around 2.6 percent. Adding to this figure an estimate of death and economic turnover, we can easily support a rate of 2.8 percent.

What are the obstacles to getting started in farming? Finding a farm was reported as the No. 1 difficulty in the central Illinois county under study. Financing the necessary operating capital was the second major problem. The seriousness of these problems is clearly emphasized by the fact that our sample group has already (by age 32) experienced a 15 percent economic mortality among its beginning farm firms. Out of a total of 12 casualties in two samples, two quit farming because they could not get along with father or father-in-law, two were clearly incompetent managers, three were dissatisfied with high risks and low returns on their farms, one was not married and found farming without a wife not acceptable, and four had their farms sold out from under them and they were unable to get other farms.

Those boys who are now farming reported an average present investment of $10,000 in their jobs. Less than one out of ten of their classmates who are not farming reported owning any of the equipment or real estate with which they work, the average for the group being less than $800.

To return to Bradford's paper, I must say I agree with his emphasis on the importance of managerial competence among beginning farmers without ample family assistance. It is at this point, however, that I would rearrange the architecture of his structure, and some of the furniture as well.

Instead of giving the decision-making function a subordinate role I suggest that it become the framework within which we can most fruitfully analyze and evaluate the problems of beginning farmers.

The status of entrepreneur is the one being sought. What could be more appropriate than an analysis of its requirements in terms of its functions? For this broader purpose the concept of the management function presented in Bradford's paper is not entirely appropriate. The management function is primarily a decision-making function with appropriate action to implement the decisions. This is, in fact, implied in his definition of management as "a personal, intangible process of attack on problems."

The process of decision- or choice-making can be visualized as involving three phases: (1) the awareness or knowledge inventory; (2) information-seeking or information-yielding activity; and (3) formulating the conclusion, decision or choice.

The awareness inventory, or degree of knowledge possessed by the individual,

forms the mental environment in which the decision or choice is made. My concept includes five types of knowledge which different individuals may possess in varying degrees, and which the same individual will possess in varying degrees through time. These are: (1) awareness of a need, desire, a lack or a want; (2) awareness of a possible source of satisfaction of the felt needs, desires, etc., a goal or objective; (3) awareness of obstacles or requirements for the attainment of the goal; (4) awareness of means, alternative means and alternative goals; and (5) awareness of possible and probable consequences (favorable and unfavorable) of alternative lines of action, or of inaction. The last type of knowledge you are all familiar with under the term, expectations.

Suppose we pause a moment to apply this part of our concept to starting in farming. A conscious need or desire is a necessary part of economic motivation, but the awareness of a source of satisfaction is necessary to give direction to this motivating force. Not all farm boys see farming as a source of satisfaction for their desire; hence, a partial explanation for the usual response from agriculture students to vocational choice questions. Such responses, usually heavily in favor of farming, as were Bradford's students, may be naive or immature expressions based largely upon the first two types of knowledge with little serious consideration of the means-end requirements. A Pennsylvania study indicated that in 1943, ten years after graduation from high school, fewer than one in ten were engaged in work they chose as freshmen in 1929, and fewer than two in ten did what they chose as seniors in 1933.

This awareness concept indicates, as Bradford has so well stated, the importance of educating farm boys to an awareness of means already in existence as well as to develop better tenure and credit arrangements to assist young men to get established in farming. To experience a need without knowledge of means toward its satisfaction can lead only to misdirected effort, economic waste, frustration and final abandonment of the goal.

Information-seeking or information-yielding activities (learning) provide a solution to this problem. Such activities include: (1) observation (watchfulness, alertness); (2) investigation (inquiry, study, experiment); (3) perception and insight (cognition, recognition, understanding); and (4) interpretation (analysis, deduction, induction, and synthesis, leading to conviction, belief). These activities, whether deliberately pursued through formal education, or accumulated in life experiences, serve to modify the individual's knowledge or awareness inventory.

Formulating the actual decision is a mental determination involving an imaginative projection growing out of an expected means-end relationship with reference to a particular objective.

Once the decision has been made, the individual must implement the decision by initiating and supporting appropriate action. Here we encounter two considerations: (1) possible avenues to action, and (2) the concomitants of action. As possible avenues to action we recognize: (1) personal execution; (2) explicit direction; and (3) delegated authority. Among beginning farmers the first is perhaps the only one available, and not a little of their tendency toward internal capital rationing and scale limitation may be due to uncertainty about their own ability. An awareness or feeling of personal inadequacy (whether founded on fact or not) may well be a part of the decision-making environment of many farm-reared boys who either never attempt to get into farming or who get in on a very conservative basis.

As concomitants to action I list: (1) social responsibility (liability) and (2) exposure to the consequences of the action. These consequences may be: (1) satisfactions (economic gain) or (2) failure (economic loss). The individual, by his action, has placed himself in a position to receive the satisfactions and benefits arising therefrom. His role is now completely passive, for to divest himself of either favorable or unfavorable consequences requires a new decision and new action. This is in distinct contrast with the Johnson-Bradford concept of an active acceptance of consequences as a part of the managerial function. It is my thought that the individual is active with reference to consequences only insofar as his expectation of them influences his decision, or insofar as past consequences affect his expectations from future action.

Thus, viewing entrance into and managerial activity in farming as a series of decisions and action by an individual, we may cast the problems, which Professor Bradford has so well presented, into a meaningful framework for analysis, evaluation and remedial action.

The decision-making or managerial function presented above may be summarized in outline form as follows:

An Outline of the Decision- or Choice-Making (Managerial) Function

I. Deciding—a mental determination
  A. Awareness or knowledge inventory (the mental environment of decision)
    1. Awareness of a need, desire, lack, or want
    2. Awareness of a possible source of satisfaction for the felt needs, wants, and desires
    3. Awareness of obstacles and requirements for the attainment of the goal
    4. Awareness of means, alternative means, and alternative goals
    5. Awareness of possible and probable consequences (favorable and unfavorable) of alternative lines of action, or of inaction
  B. Information-seeking or information-yielding activity which modifies the knowledge or awareness inventory (learning)
    1. Observation (watchfulness, alertness)
    2. Investigation (inquiry, study, experiment)
    3. Perception and insight (cognition, recognition, understanding)
    4. Interpretation (analysis, deduction, induction, and synthesis, leading to conviction, belief)
  C. Formulating the decision—a mental determination involving an imaginative projection growing out of an expected means-end relationship with reference to a particular objective
II. Implementing the decision (initiating and supporting appropriate action)
  A. Avenues to action
    1. Personal execution
    2. Explicit direction
    3. Delegated authority
  B. Concomitants to action (passive phase for the decider)
    1. Social responsibility (liability)
    2. Exposure to consequences
      a. Satisfactions, economic gain
      b. Failure, economic loss

FARM MANAGEMENT II

Chairman: G. W. Miller, Ohio State University

PROBLEMS AND POSSIBLE SOLUTIONS IN DETERMINING INPUT-OUTPUT RELATIONSHIPS IN AGRICULTURAL ENTERPRISES

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NO ECONOMIST would deny the importance of the role of input-output relationships in the decision-making process. If the farmer is expected to approach the conditions usually set up for maximum efficiency in resource use, it is necessary that he know the various quantitative relationships, broadly referred to as input-output relationships. Much of our recent research is directed toward establishing and quantifying these. In so doing, the researcher faces many problems. These may be placed arbitrarily in four groups, namely: (1) those involving human aspects, (2) those arising from the nature of existing physical data, (3) those encountered in securing additional data, and (4) those met in using existing or additional data.

Problems Involving Human Aspects

Large errors in estimating input-output coefficients may result from personal bias of the researcher in selecting and using information. Personal bias may also result in errors in logic or methods used.

Perhaps the desire to improve agricultural economics research is strong enough in most cases to withstand the forces which influence a person either to cling tenaciously to old views or at the other extreme to embrace every novelty. Those engaged in scientific work need not only time for reflection and material for research, but also an environment that respects the pursuit of truth and allows freedom of expression of intellectual doubt even though this may challenge its most sacred or established institutions. Intellectual courage of a high order is needed to face such difficulties and to overcome illusions that are temporarily pleasant but ultimately destructive. Fear of offending established dogmas and respected sentiment is a strong hindrance to research in agricultural economics.

Many of our beliefs rest on the tacit acceptance of current attitudes or on our own unreflective assumptions. We often find ourselves challenged either to support or to change our beliefs. It takes courage to question or refute a proposition which one has always accepted. Too often, the issue is avoided by conveniently, perhaps unintentionally, closing the mind to all contradictory evidence. Sometimes, instead of

simply and directly defending one's own beliefs, the appeal is made to some respected authority to substantiate such views held, but to be an authority is not synonymous with infallibility. On other occasions, the reason or excuse may be "lack of time to settle the problem," though strong uncritical intellectual allegiances may more nearly be the real reason.

In early agricultural research, it often was expedient to use an intuitive idea or to make simplifying assumptions because of the paucity of research to meet some urgent need. However, when such assumptions as linear relationships in livestock feeding, or perfect complementarity as in Liebig's "law of the minimum" concept, exist for long periods, a problem exists in getting researchers to challenge the accepted, design new experiments to obtain new evidence, and incorporate the findings into a logical framework upon which future work can be added. We are inclined to be too conventional in our methods. This may be due to fear of challenging the authority and finding oneself in error as well as to the ease of following the traditional pattern.

Problems Arising From Nature of Existing Physical Data

The economist is interested in such questions as which combinations of inputs are achievable and which are not, how much product can be obtained from a given combination of inputs, or how much of one input would be required to produce specific amounts of product given the combination of other inputs so he can determine the most efficient situation or choice. These possibilities from which choices are made are defined by fields other than economics. Thus, they are expected by economists to provide the substitution and transformation rates. But, plant and animal scientists often have other objectives or think in different terms, and consequently their findings do not provide adequate data for constructing input-output relationships.

Numerous problems are encountered when one uses current physical data for input-output work. Many biological experiments consider no alternatives from which a farmer can choose because they have been designed to compare a single point on a given production function with a single point on another function, e.g., alfalfa hay vs. soybean hay, boron vs. potash, water vs. nitrogen, etc. These comparisons are of value for certain purposes, but they are distinctly limited for use in establishing input-output relationships. There appears to be no reason why the relationship found between the factors studied would remain the same when the level or the combination of fixed factors is changed. This may be due to such possibilities as having one of the factors studied more complementary to the fixed factors than the other one. In short, economic analysis of

empirical observations in which production functions are compared can be valid only when the input combination for each function is at an optimum. The chief value of such experiments for input-output work seems to lie in providing general information for the researcher to use, along with other information which he must acquire, to estimate relationships. However, many years of collecting single observations from each production function may enable a person to became fairly proficient in making choices, even though his observations are not truly comparable but made comparable subconsciously in his deductive process.

Problems result also when response data to variable inputs are obtained by assuming the level of fixed inputs constant when actually they are not. The response obtained from an input depends in large part on the level at which other inputs are fixed. In addition, the response to a given unit of an input depends on the number of units of that input already used. Thus, it is extremely important for the economist to consider the design of the experiments from which input-output data are obtained. For instance, in supplemental irrigation the response to irrigation as compared to no irrigation depends on the moisture level already in the soil. During a year of extreme drought, the response to 6 acre-inches of water may be tremendous while in another year of near adequate rainfall, the response to 6 acre-inches may be insignificant. Also, the response to 6 acre-inches applied to a crop on soils high in fertility is very much different than if applied on soils low in fertility .The operation of both concepts of diminishing productivity and changing marginal rates of input substitution necessitates the development of a framework within which variables are studied, or within which results from poorly designed studies are considered. Unless this is done, we will soon have a large collection of noncomparable case observations and situations, none of which provides any particular basis for making decisions.

The economist in studying input-output relationships is reluctant to rely firmly on the generally accepted feeding standards and recommendations in their present state. These are based on assumed linear relationships with respect to grain-forage substitution and returns to scale. We know that the feeding value of corn for cattle is much greater when fed with alfalfa hay than when fed alone; and, according to Forbes,[1] the determination of consistent feeding values would require the presence of all nutrients in optimum quantities and proportions. Thus, the feeding value of a particular feed for an animal depends upon how it is combined with other feeds. The comparison of a grass hay with alfalfa hay at a given level of grain feeding will not hold true at other levels of grain

[1] E. B. Forbes, "The Problem of Determination of Net Energy Values of Feeding Stuffs," *American Journal of Physiology*, Vol. 92, 1929.

feeding. The feeding value of a roughage when fed with a given quantity of grain will not be the same as when fed at other levels of grain feeding. The need to determine the rates of substitution of grains and forages over the entire range instead of studying isolated points appears self-evident.

Feeding standards have been defended on the grounds that they are to be used only as rough guides. While this probably is a valid defense, many rely on the exactness of the standards for use in further experimental work. In this connection, a problem is encountered when response data are obtained by methods assuming linear relationships when nonlinear relationships are inherent in the data. A common technique in determining the T.D.N. obtained from pasture is a residual method based on feeding standards.[2] This technique permits the pasture to claim the difference between feed needed as determined by the standard to produce a given product and the feed actually fed. The method is simple but weak. As pointed out previously, standards assume constant rates of feed substitution and they disregard the law of diminishing returns. In addition, the complementary effects of grain and pasture are assigned to pasture. At low levels of grain feeding the productivity of grain appears to be very high. If only a small amount of grain is fed to livestock on pasture, then the residual T.D.N. value from pasture would be high and tend to be overvalued.

In some experiments, input units are too large for refined analysis. For example, agronomists in fertility work often use nitrogen in 0, 40, 80, 160 and even 320-pound units. The increments of 80 and 160-pound units are too large to interpolate between. In growth data on pigs, as another example, much information is lost by citing average gain per day from 0 to 120 days instead of daily gain. Improvements in experiments such as these can be made with little difficulty to the researcher. In recent years our physical scientists have begun to appreciate the role of marginal analysis, and are designing experiments to explore various substitution and transformation rates.

Problems in Securing Additional Data

From the foregoing, it is obvious that much of the physical data available from past experimentation are not suited for determining adequate or logical input-output relationships and when used extreme care must be exercised. However, economists faced with the problem of securing additional and better data cannot sit idly by waiting for data to be provided in the desired form. We can make better use of what is available; we can assist our colleagues in physical sciences in designing and con-

[2] For method see J. C. Knott, *et. al., Methods of Measuring Pasture Yields with Dairy Cattle,* Bulletin 295, Pullman: Washington Agricultural Experiment Station.

ducting future experiments; we can supplement this with data obtained through other methods, such as sample surveys, record books, and using engineering data as in farm work simplification; and we can exploit every technique that offers a possible contribution, such as estimation of various relationships consistent with a logical framework, use of adequate statistical techniques, and improved budgetary procedures.

Of the methods common to the production economist, cooperative experimentation with the physical scientists perhaps offers the greatest potential for establishing adequate input-output relationships. To be successful in this method, physical scientists as well as economists must appreciate the role of economic theory and be willing to question convention and authority. The friendly advice offered by a physical scientist to his colleague in economics to be careful about "sticking his neck out" because he is contradicting 30 years of research and teaching by authorities can hardly be regarded as scientific. It would be a very productive use of the research dollar for the economist and his colleagues in the plant and animal sciences to work together toward improvement in the quality of data and the developments of richer and more realistic hypotheses. A particular job for the economist is to reformulate his theory as measureable hypotheses and elucidate on the quantitative implications. Cooperative effort would be necessary in setting forth objectives of experiments, in designing experiments, in general supervision of the study, and in analysis and interpretation. Participation is a two-way street and it has met with apparent success at some institutions. A big obstacle in many institutions lies in rigidly defined "departmental" boundaries or bailiwick. The economist must be well-versed in experimental design if he is to secure the data needed for extended economic analysis. Since it is virtually impossible to provide empirical facts for the economic solution of every problem, the physical scientist and the economist can productively concentrate their energies toward establishing and measuring relationships among variables within a suitable theoretical framework. Thus, the handling of farm problems within the logic of economics not only will simplify the research task but also will provide more of the answers to farm problems than will the direct use of quantitative data.

The sample survey is another means of securing data which economists have used from the very beginning. In using a survey it is essential to develop a model or hypothesis of presumed relationships to be examined and avoid gathering data on mixed production functions. As an example of error or at least faulty analysis, we often see studies using cross tabulation to determine effect of quality of land on farm income. The higher incomes attributed to higher quality land really include the return from more inputs in form of machinery, labor, fertilizer, livestock, better man-

agement, etc. In addition, data obtained through conventional farm management surveys are one point observations and as usually handled are of questionable value in determining the value productivity of resources. Similar observations may be made with respect to the accounting system commonly used in farm management research. If this type of data is relied upon, there is a little chance of a theoretical model of expected relationships becoming a verified or rejected hypothesis. A greater use of a theoretical framework causes the researcher to be more conscious of the resource relationships. His model, which is a theoretical solution, is precise in specifying the relations between or among variables. No science can advance very far until it is able to develop a logical theory and make precise measurements.

Problems in Using Existing or Additional Data

However good the raw data one has, unless utilized accurately and fully, much value will be lost. In the first place much information is lost when the physical scientist or the economist converts his data to dollar values and releases only that portion. Many times this eliminates the possibility of utilizing the data for other purposes. In addition, promiscuous use of the average concept without a measure of variation not only reduces the usefulness of the information but may encourage decisions or recommendations not warranted.

Should economists fail to achieve the desirable close cooperation with other sciences they yet can do much in the immediate future to use existing physical data, as well as additional data obtained by other methods, in establishing input-output relationships. In the Land Grant College system there appears to be large quantities of unrelated and undigested data. Through intensive use of the thinking processes, which incidentally is hard work, a large part of these data probably can be salvaged through the use of economic logic. With economic models, which can be subjected to biological limitations, the economist can synthesize from raw data and estimate fairly accurately a production surface that will yield valuable information with respect to rates of factor substitution, rates of factor-product and product-product transformation. Work of this sort serves the purpose of subjecting the physical data as well as the thinking in different disciplines to more careful scrutiny, pointing out the weak points in our theory and the areas of most needed data to which additional work can be directed. These are in addition to the immediate use that can be made of the synthesized data in providing a basis for adjustments due to changes in choice indicators.

The synthetic method of handling data lends itself to the construction of cost relationships which, to be meaningful and useful, must be identi-

fied with a specific production process, planning span, and level of prices. Such cost schedules provide, for example, information on the cost structure for different type of barns when decisions to build or remodel are being made or on cost structure of supplemental irrigation. They are valuable also to the farmer who constantly seeks the low relatively elastic marginal cost situation which will permit economic flexibility in case of adversities. Care must be taken not to have a preconceived idea of the nature of the cost curve as some average variable cost curves are horizontal within a range and not U-shaped. A major difficulty with the synthetic method as with other methods pertains to the allowance for uncertainty, such as building flexibility into the structure or discounting the future. Uncertainty is recognized in various degrees by different farmers. Some farmers prefer to expend more in the form of variable expenses than in the form of fixed expenses in order to be able to readjust quickly if desired. This consideration would not appear if only technological efficiency is considered.

The economist can improve his surveys and techniques in handling survey data. In the last few years many improvements have been made. Survey data have been grouped into input categories for which the marginal value productivity can be estimated by fitting some regression equation. When the Cobb-Douglas equation is used, for example, considerable judgment is used in categorizing the inputs which are known on basis of production economic theory and a knowledge of agriculture to be related to gross income in a casual manner. In addition, there is a group of unmeasured inputs, such as weather, management, etc. which has an important influence on gross income but the general assumption of fixity or random distribution doesn't necessarily render the technique invalid. However, the marginal productivity of a given category used sparingly to enable greater use in a later time period may appear unduly high if motives regarding time possibilities are not considered. By comparing the estimated marginal value product of a resource category to the probable cost of employing a unit of the category and by making similar comparisons among all other resource categories, valuable insights can be gained into the problem of determining the quantity of particular resources which should be employed and how the several resource categories should be combined.

The limitations of the Cobb-Douglas idea exist also in most other techniques but it has several net advantages over many other techniques in that it yields marginal value productivity estimates for categories of inputs, and it is unnecessary to assume the earning power of other inputs as in common farm accounting procedures. When using the Cobb-Douglas technique, care must be exercised in selecting the sample. To be of maxi-

mum value, all farms in the sample should be operating on the same production function if possible. However, a perfectly homogeneous group cannot be attained. Through proper stratification, the sample can be expected to give estimates that are statistically significant, though some researchers have used estimates with errors several times as large as the estimate itself. Among other things, the sample must not consist of a group of different sized farms operating at a competitive equilibrium. If they are operating at a competitive equilibrium, the estimated function for the group would be an envelope curve (interfirm) tangent to the total product curve of each firm (intrafirm) at the point of competitive equilibrium making only the equilibrium point of the intrafirm function relevant at any point in time.[3] Marginal value products estimated from the envelope curve would be over-estimated for quantities of an input used above competitive equilibrium and under-estimated for quantities used below competitive equilibrium. Only if all firms have the same production function will the fitted functions coincide with the actual function. Since it appears that production functions vary from firm to firm and over time, the problem is somewhat analogous to that of estimating demand functions from observations over a period of years. If the purpose is to predict output of a group of firms whose technical characteristics do not undergo change, the best (unbiased and efficient) estimate of marginal productivity is obtained by the single equation least squares method. This assumes that all variables are determined by the same set of random causes that prevailed in the period of observation. If this assumption is not fulfilled, the prediction of output requires an alternative estimation process such as simultaneous equations.[4]

Another technique relied on by economists to utilize available data plus estimates is the budgeting process. The usual procedure has been to secure a set of average data from surveys or account books. These, called "unit requirements," are assumed to be discrete, linear, and without error. Some improvements[5] can be made that will permit some relaxation of these assumptions and allow the use of standard statistical procedures in making prediction.

In much of our input-output work it is assumed that the firm responds continuously to price changes. Actually, in many cases firms already in

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[3] M. Bronfenbrenner, "Production Functions: Cobb-Douglas, Interfirm, Intrafirm," *Econometrica*, January 1944, 35-44.

[4] J. Marschak and W. H. Andrews, "Random Simultaneous Equations and the Theory of Production," *Econometrica*, 12:143-205.

[5] See E. O. Heady and R. V. Baumann, "Budgeting Techniques in Estimating Farm Adjustments and Marginal Returns," *Agricultural Economics Research*, Vol. 5, No. 3, July 1953, and the work of North Central Regional Farm Management Research Committee.

operation are limited to discrete processes and will respond discontinuously to price changes, i.e. they will be insensitive to price changes over a certain range and will change their levels of output or change processes of production drastically as soon as that range is passed. However, the planning stage, i.e. before resources are committed to production, may be continuous. The consideration of this refinement will be left to Earl Heady's discussion on linear programming.

Too much reliance on statistical procedures without carefully developed logical theory can lead to erroneous conclusion. A curve fitted to single observations each taken from separate functions may and often does approach a straight line. One study[6] concluded that almost perfect correlation exists between corn yields and nitrogen content of soil. Upon examining the study, one finds each observation was taken from a different soil type. Certainly the economist would insist upon staying on the same function with different levels of nitrogen, including use of only one soil type at a time. I suspect that a part of the cause of the limitations of our present feeding standards is due to the handling of data from feeding trials in this manner.

Problems relating to choice and combination of inputs over time are particularly difficult to handle because so much depends upon the nature of the time preference possibilities possessed by the manager or by the family. When risk and uncertainty are introduced, further difficulty is encountered in estimating input-output relationships because time preferences, production possibilities, and degrees of knowledge vary among families. This suggests a measurement of utility. The complex nature of time preference pattern varies with different families and cannot be extended easily from an individual pattern to a social pattern.[7] This may act as a barrier against profitable resource adjustment between the firm and the household if data are aggregated. With low incomes, the pressure to live out of current income leads many to choose the input-output relationship which they think are more certain. They are perhaps more certain of input-output relationships if based upon personal experiences, custom and tradition rather than upon something new. Thus, in working up input-output data with uncertainty as a major factor, it would be difficult to incorporate such technical coefficients, particularly when uncertainty is viewed in varying degrees by different farmers.

In conclusion, if economic research is expected to move ahead at a rapid pace, it would be desirable to allocate funds for research in

[6] See the work of Jenny, Klemme, *et. al.* at Missouri as reported by B. A. Krantz, *Fertilize Corn for High Yields*, N. C. Agr. Expt. Sta. Bul. 366, and W. B. Andrews, *Response of Crops and Soils to Fertilizers*, State College, Mississippi.

[7] See K. Arrow, "A Difficulty in the Concept of Social Welfare," *Journal of Political Economy*, 58:328-346, 1950.

methodology. In the past, the new methods introduced, with a few exceptions, are by-products of research. There is an urgent need for increased accuracy in measurement of variables viewed with economic logic, for which there is no substitute. Increased attention on sampling, for instance, may result in more accurate estimates of productivity relationships. Since farm conditions often differ greatly from experimental conditions, it may be that some estimational procedures could be developed which would provide more "practical" input-output information than under experimental conditions.

DISCUSSION

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I am in complete agreement with Professor Redman with respect to the importance of input-output data in the decision-making process. I do not agree with his statement that ". . . cooperative experiments with the physical scientists offer the greatest potential for establishing adequate input-output relationships."

In helping young farmers to develop plans for farm operation, there is a continuing need for input-output data. The information which these young men want is the experience of other farmers operating under conditions similar to their own. They want to know what to expect assuming that their management, like that of other farmers, will be less than perfect. The scientist looking for new facts in crop and animal production wishes to set up experiments in which all factors except one are held constant. In so doing he usually eliminates many of the causes of loss under actual farm conditions.

Redman discusses the problem of determining the T.D.N. derived from pasture by a residual method based on feeding standards. His discussion centers on the question of "assuming linear relationships when non-linear relationships are inherent in the data." A much more important question which has been overlooked by Redman is the amount of hay fed to a cow. The feeding standards are, correctly, based on the amount of hay which a cow actually eats. The farmer's information is not how much hay went through the cow, but how much went through the manger. The amount of hay which goes through the manger but not through the cow is considerable and renders the residual method of determining T.D.N. from pasture difficult to apply.

This question of hay requirements for a dairy herd is a major one in planning the organization of a dairy farm. If the requirements based on feeding standards are used, it appears that more cows can be kept than would be possible if the requirements based on farm experience are used. The experimenter working on the nutrition of dairy cattle is correct in using only the hay actually eaten as a basis for his calculations. It would be wrong for him to include the wasted hay and that which went over for bedding. In making decisions with respect to the organization of a dairy farm it would be equally wrong if the wasted hay and that going over for bedding were not included.

To say that the scientist working on a nutrition experiment should try to report actual farm conditions is wrong on two counts. First, this introduces many

additional variables into his experiment. Second, farm conditions cannot be discovered at an experiment station.

Another example of the problem of using experimental data as a basis for input-output relationships in farm planning concerns the feeding of laying hens. Using experimental data, Byerly[1] reports 93.7 pounds of feed required per year for a 5-pound hen laying 200 eggs per year. Carpenter[2] reports an average of 115 pounds of feed per layer in White Leghorn flocks averaging 203 eggs per year. Why the difference of approximately 20 pounds of feed?

The feed consumption reported by Byerly was obtained from experimental data for individual birds and reports what was actually eaten. This is the proper information for his purpose which is stated as ". . . in preparation for experiments to determine whether or not individual differences in net efficiency are inherited."

Carpenter's data are from commercial poultry farms and include all the feed which was used by the laying flock. On both experiment station farms and commercial poultry farms some feed is eaten by rats, and there is some waste of feed all along the line and particularly from the feed troughs. From the economic point of view (Carpenter's study) all this wasted feed is included and the hens must pay for it. From the nutritional viewpoint (Byerly's study) only the feed actually eaten by the hen should be included.

The difference of approximately 20 pounds per hen would amount to about 20 tons for a 2,000-hen flock. At $80 per ton this would amount to $1,600–a considerable item in the "decision-making process."

Cooperation between various workers at an experiment station is desirable, and generally occurs when needed. However, the suggestion that the most important source of input-output data is cooperative studies is open to question.

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[1] T. C. Byerly, *Feed and Other Costs of Producing Market Eggs.* Maryland Agricultural Experiment Station Technical Bulletin A1. July 1941, page 13.

[2] Kendall S. Carpenter, *Hatching or Market Eggs?* Cornell Agricultural Experiment Station Bulletin 896. August 1953, page 17.

SIMPLIFIED PRESENTATION AND LOGICAL ASPECTS OF LINEAR PROGRAMMING TECHNIQUE

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BECAUSE of its "apparent complexity," linear programming is not widely used. Our purpose is to simplify presentation of the logic and computational method. We use no complex mathematics. "Conditions and limitations," not explained in "rigorous fashion" here, can be found elsewhere.

Compared to Budgeting

Budgeting is the same general technique as programming, but it uses different computational methods. Both techniques use the assumption of linearity, constant input-output ratios. Hence, budgeting has the same limitations as linear programming, and vice versa. Wherever one gives a screwy answer, so will the other.

There are, however, these differences in the methods: Budgeting seldom is used to find the one unique production program, out of many, which gives maximum profits. Ordinarily, it is used to determine which one of two producing methods or farm organizations are best. The many other alternative organizations are not examined. Budgeting could be used, to determine which one of a hundred programs gives greatest return; but it is too time consuming. Linear programming has the advantage for large-scale problems; it can specify the optimum program in a fraction of the time required for the more cumbersome budgeting. Hence the recommendation: When the problem is "large scale," use linear programming as a time saver. When the problem is "small scale," use budgeting. Linear programming also can "dip deeper" into problems. Under budgeting, it is seldom feasible to break labor down into subclasses by months or weeks, soil into different classes, etc., until there are perhaps 50 different resource groups to limit the production and specify the optimum combination of enterprises. Linear programming can be used in this manner to consider how the limitations or shortages of all resources "converge" in determining exactly the one optimum use of resources. Linear programming is used where two or more fixed resources serve in a limitational capacity to the final program. Under the assumptions of the method (constant coefficients and resources in fixed proportions), there is no reason to set up matrices and work lengthy solutions if all resources are variable. The answer can be obtained by simpler budgeting methods. Linear programming should be used only where there is an "opportunity cost" problem. Budgeting also is used for farms with fixed resources but need not be restricted to these situations.

Computations must be accurate for both methods. But more important than the arithmetic computations is the "assembling" of input-output coefficients and prices. Both methods require the same technical coefficients and price quantities. If these are available for a budgeting problem, linear programming can be applied to the same problem, and vice versa. Mistakes in input-output coefficients or resource requirements, will "lead answers astray" in one case as in the other. The principal task in both methods is assembling input-output coefficients and prices. Also important is the logical model constructed in the "thinking through" stage of the study. The concepts used must be set forth efficiently.

Opportunities for the Technique

Linear programming, as a mathematical technique, has many possible uses. For example, in farm management it can be used for determining: 1. The best combination of (a) crops alone, (b) livestock alone, or (c) crop and livestock enterprises together; 2. The best or least cost technique such as different (a) types of mechanization, (b) strains and qualities of crops or livestock, (c) conservation farming; and 3. The optimum combination of all these different enterprises and practices considered together. The basic procedure can be applied in essentially the same manner to all these problems. We simply treat each enterprise or each method of production as a different activity (enterprise or process). For example, milk may be produced with 8 different methods (different breeds or capacities of cows, different rations or different housing schemes). Milk produced by each of these methods can be looked upon as a different product or enterprise (i.e. activity). The problem is to select the one "enterprise" (method, or activity) or combination of the 8 "enterprises" which gives greatest returns, considering the fixed resources available. After the slight change in concepts to consider milk from different methods as individual enterprises (i.e. eight milk enterprises exist) we apply the basic technique outlined below to solve the best combination of "distinct" enterprises.

The Logic of Linear Programming

The logic of linear programming can be explained with a simple two-crop example: A farmer wants to decide between two crops, wheat and corn. He has the following "fixed" amounts of resources to use on the two crops: 100 acres of land, $2100 of expense capital, 200 hours of August labor and 160 hours of September labor. (For simplicity, assume other summer months are required elsewhere and winter months are not necessary for crops.) The per acre (a) yields and (b) capital and labor requirements are shown under I in Table 1. Requirements of land, capital

and labor per bushel are shown under II; these quantities are referred to later as "input coefficients." III of Table 1 shows the maximum amount of corn or wheat which can be produced with each resource if (1) all of this resource is used for the one crop, and (2) all other resources except the one under consideration, are available in unlimited quantities (and combined in the specified fixed ratios).

Now construct figure IA from the data under III of Table 1. Connecting the maximum production points (from III in Table 1) on the corn and

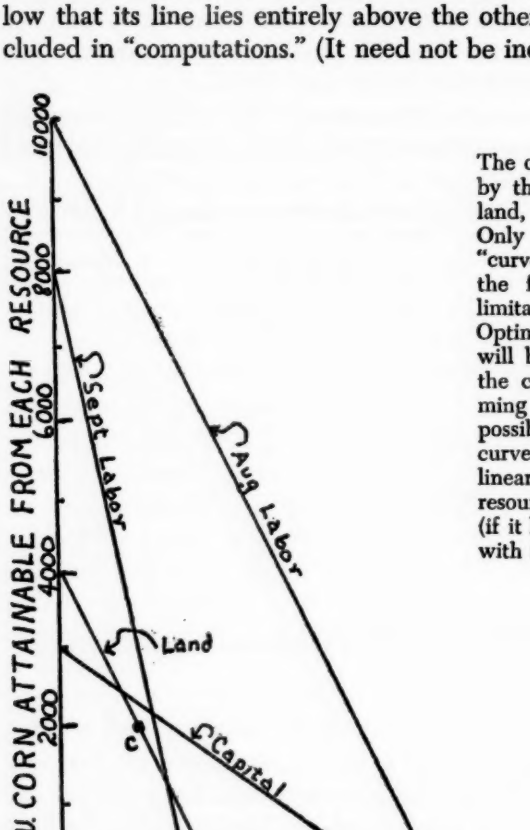
TABLE 1. EXAMPLE FOR ILLUSTRATION OF LINEAR PROGRAMMING LOGIC IN FIGURE 1

Item	Corn	Wheat
I. Per acre: yield	40 bu.	20 bu.
Capital expense requirement	$28	$10
August labor requirement	.8 hr.	.8 hr.
September labor requirement	.8 hr.	2.0 hr.
II. Per bushel requirement of[a]		
land (acre)	.025	.050
capital ($)	.70	.50
August labor (hr.)	.02	.04
September labor (hr.)	.02	.10
III. Maximum production (bu.) from:[b]		
land (100 acres)	4,000	2,000
capital ($2100)	3,000	4,200
August labor (200 hrs.)	10,000	5,000
September labor (160 hrs.)	8,000	1,600

[a] Per acre requirement under I divided by yield per acre.
[b] Computed by dividing resource supplies in stub of III by corresponding per bushel requirements under II.

wheat axes, gives four straight lines. These are iso-resource lines, indicating all possible combinations of wheat and corn which can be produced with the "fixed" amount of the particular resource, if other resources are considered to be unlimited. The fixed supply of land (100 acres) allows (a) 4000 bushels of corn, (b) 2000 of wheat, (c) 2000 of corn and 1000 of wheat (point c) or, any other combination represented by the land line. Similarly each of the other lines defines the production possibilities for using the particular resource. Aside from August labor, each one of these resources is scarce and limits production from the other resources: Land allows a maximum of 4000 bushels of corn; capital allows a maximum of only 3000. Capital allows a maximum of 4200 bushels of wheat, but production from land is limited to 2000; September labor limits wheat to 1600. Hence the points of intersection of the curves for land, capital and September labor define the production possibilities open to the farmer. Points on the resource lines, above the intersection points, denote enterprise combinations which are not attainable because another resource is limitational. The segments of the three curves, falling "under the intersec-

tion points," define the farm's production possibilities: It can produce any combination of crops falling on this "curve." August labor is not a limitational resource: there is so much of it and its input requirements are so low that its line lies entirely above the other curves. It need not be included in "computations." (It need not be included even if it does intersect another line outside the possibility curve defined above.) Figure 1B shows, more clearly, the relevant production possibility curve, defined by the intersection points in 1A. Segment *a* comes from the "capital line" in 1A; segment *b* comes from the "land line" and segment *c* comes from the September labor line. The problem now is to find the optimum production program, defined in the conventional manner of product substitution rates (the slopes of the 3 segments of the opportunity curve in



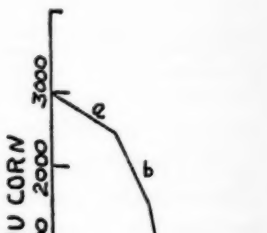


FIGURE 1

The opportunity curve in B is defined by the intersection of the 3 lines for land, capital and Sept. labor in A. Only the quantities defined on the "curve" for B are possibilities open to the firm. This curve considers the limitations imposed by each resource. Optimum production combinations will be at the "ends" or "corners" of the curve. We have linear programming conditions since segments of the possibility curve are straight lines. The curves on most farms likely are of this linear segment nature, because each resource prescribes a set of possibilities (if it had enough other resources to go with it).

1B) in relation to price ratios. Linear programming accomplishes this very thing. In effect, it (a) takes all possible products and resources and "fashions out the production possibility curves for each pair" and (b) "applies the product price" ratio to these possibility curves and specifies the optimum product combination.

If we had only 2 products, the most efficient way to determine an optimum program is by a simple geometric procedure, such as Figure 1. (A few graphs of this nature, or their arithmetic counterpart, are useful in formal programming for determining which resources are non-limitation.) However, geometry "breaks down" when resources can be used for many enterprises (methods of production). Hence, the algebra of linear programming becomes more appropriate. Even then, the basic logic is the same as that above.

The Computational Technique

The remainder of this paper includes a very simple presentation of linear programming techniques. It employes the simplex method and is for "beginners," rather than "post graduates in econometrics." We refrain from presenting complicated symbols or equations in order that the audience can be widened.[1] Two illustrations are provided: 1. One with an arithmetic or empirical example which can be checked by the reader; and 2. One with table cells identified by letters and numbers which can be followed in mechanical fashion. The two examples can be followed by a junior clerk. The only tool of understanding required is knowledge of simple arithmetic.

Empirical example

The empirical example, which can be solved by "plain arithmetic" deals with the use of scarce resources for alternative enterprises. A farmer has a choice between corn, potatoes and oats. He has 100 acres of land to use for these crops and $5,200 in capital for cash expenses. He also has varying amounts of labor available in each month. Some simple calculations, such as those for Figure 2, show that only the labor of March, April and May are limitational.[2] The labor supply in these 3 months is

[1] No attempt has been made to explain the algebraic logic of the steps or to use the notations of matrix algebra. These details are explained very well elsewhere. See A. Charnes, et al., *An Introduction to Linear Programming*, Wiley & Sons, New York, 1952; R. Dorfman, *Application of Linear Programming to the Theory of the Firm*, University of California Press, Berkeley, 1952, and Bernard J. Bowlen, and Earl O. Heady, *Application of Activity Analysis to Selection of a Crop Program*, Iowa Agr. Exp. Sta. Bul. forthcoming, and R. A. King, "Application of activity analysis," *This Journal*, Dec. 1953.

[2] Labor requirements in other months are so small, relative to the supply, that even if only the "high labor crop for each month" are produced, he still has surplus

respectively 190, 200 and 120 hours. One necessary step has now been completed; namely, the specification of the supplies of fixed resources which can limit the program.

The second step is determination of the input requirement or coefficients. These are given in Table 2. They are computed in the lower half, from data in the upper half, and show the amount of each resource required per unit (bushel) of each crop. Expected prices also are listed in Table 2. We have accumulated all of the basic data required for a "linear

TABLE 2. BASIC INFORMATION ON INPUT-OUTPUT QUANTITIES AND PRICES USED FOR EMPIRICAL PROGRAMMING PROBLEM SOLVED IN TABLE 3

Item	Corn (P_1)	Potatoes (P_2)	Oats (P_3)
Yield per acre (bu.)	50	100	40
Per acre requirement of:			
1. Cash expense ($)	25	80	10
2. March labor (hours)	0	3	2
3. April labor (hours)	0	4	0
4. May labor (hours)	3	0	0
Input coefficients (amount resource required per unit of crop)[a]			
1. Land (acre)	.02	.01	.025
2. Cash ($)	.50	.80	.25
3. March labor (hours)	0	.03	.05
4. April labor (hours)	0	.04	0
5. May labor (hours)	.06	0	0
Price per unit ($)	1.50	2.00	.75

[a] Computed by dividing the "requirement per acre" by the corresponding yield per acre.

programming solution." Emphasis now is on calculations for programming. Remember, however, that the figuring and thinking which go into the coefficients (Table 2) are the important considerations of programming. Subsequent steps are purely clerical. Table A (matrix) now can be "lifted" from Table 1. It simply lists the input coefficients along side the prospective resources and their supplies. For convenience, we identify corn by P_1, potatoes by P_2, and oats by P_3. The supply of resources is denoted as P_0.

The figures in Table A suggest how resources might be used: We could set up a plan where the amount of each crop produced, multiplied by its input coefficient or requirement, would exactly equal the resource supplies shown. However, we do not want to specify a final plan which "must just exactly" use the supply of all resources available. A plan to use each resource for the crops (including labor of each month as a different resource), might not maximize profits. Hence, we will say that we

labor in these months. If the labor of these other months (non-limitational months) is left in for calculations, we get the same final answer. However, inclusion of these months (separate resources) causes us to "work through" more arithmetic.

TABLE A

Resource	Supply of resource (P_0)	Input coefficient		
		Corn (P_1)	Potatoes (P_2)	Oats (P_3)
Land	100	.02	.01	.025
Cash	5200	.50	.80	.25
March labor	190	0	.03	.05
April labor	200	0	.04	0
May labor	120	.06	0	0

can either (1) use a resource for production of one of the 3 crops, or (2) let the resource go unused. Land can be used for corn, potatoes or oats; or, it can go unused. Let us denote "non-use" of this resource as an enterprise (activity), just as use of it for corn is an enterprise (activity). Hence, there are 4 "uses" (enterprises) for land: corn, potatoes, oats and "non-use." Linear programming uses the term "disposal enterprise" for non-use.

We need a "disposal enterprise," or "non-use enterprise," for each of the four resources considered in planning. We use these symbols to identify the "non-use (or disposal) enterprise" (i.e., just plain "going idle"): P_4 is for land, P_5 is for cash expense, P_6 is for March labor, P_7 is for April labor and P_8 is for May labor. Since we can "let resources go idle," as one way of using them (as well as using them for crops), we must expand Table A to Table B below. We include the "non-use (or disposal) of the resources" as enterprises, the same as for crops. We also include "input coefficients" for these "non-use enterprises." For example it requires 1 unit (acre) of land for non-use of the land resource, under our enterprise called "land non-use." No capital or labor is required for "non-use" of land. Hence, all other input coefficients are zero under the enterprise column of "land non-use" (P_4). Under the enterprise of "capital non-use" (P_5) zero land is required to "produce one unit of capital non-use"; one unit of capital is required for a one-unit "non-use of capital"; no labor is required for non-use of capital. Coefficients for the "non-use of labor" enterprises are treated similarly. Hence, the part of Table B, comparing "non-use enterprises" (disposal) with the resources, has all zeros, except for

TABLE B

Resource	P_0 Supply	P_4 Land	P_5 Cash	P_6 Mar. Lab.	P_7 Apr. Lab.	P_8 May Lab.	P_1 Corn	P_2 Potato	P_3 Oat
Land	100	1	0	0	0	0	.02	.01	.025
Cash	5200	0	1	0	0	0	.50	.80	.25
March labor	190	0	0	1	0	0	0	.03	.05
April labor	200	0	0	0	1	0	0	.04	0
May labor	120	0	0	0	0	1	.06	0	0

the diagonal from upper-left to lower-right hand corner.

In the technical terms of mathematics, we have now set up a matrix with "n" rows representing possible limitational resources; we have "k + n" columns representing "k" real activities or enterprises and "n" disposal enterprises for using resources. Table B is a matrix, but we will continue to call it a Table. We are now ready to begin linear programming computations. We transfer Table B to Table 3. The top of Table 3, between the headings and the horizontal line of o's, is the same as B, except: 2 more lines (rows) and one more column have been added. The first new line is labeled OC; to specify that it will later indicate the "opportunity cost" of using a unit of resource for various crops. The next line is labelled MR, to show that it specifies the marginal return from producing 1 unit of a particular crop. The added column R, is for determining the most limiting resource for a particular crop. The figures in it are computed after the immediate step which follows:

Finding the first most profitable crop

The most profitable crop to try is found as follows: The row OC (z) in the top of Table 3 is left blank (i.e., is "filled" with zeros). It shows the "opportunity cost" in using resources for each enterprise. The opportunity cost is zero when we are yet producing nothing (i.e. all of our resources are "in non-use" as indicated by their "full supply" under P_0). We wish to find the amount we will add to total revenue by each unit of crop which we might produce. Hence, we subtract the prices shown at the top for each enterprise from the figure immediately below on the OC (z or opportunity cost) line. The resulting figure is entered, under the respective columns, on the marginal revenue or z-c line. The prices (c) denoted for the "non-use" enterprises are zeros, since one requirement of linear programming is that a resource cannot have a cost (negative price) attached to it if it "goes idle." The crops have the prices (c) decided on earlier in Table 2. Hence the MR or z-c value is zero for all columns P_0 through P_8, i.e. for all of the "non-use" enterprises. But for corn, the z-c figure is: 0 minus $1.50 = -1.50$. For potatoes it is: 0 minus $2.00 = -2.00$. For oats it is: 0 minus $.75 = -.75$. We now look for the crop with the largest negative z-c value. It is potatoes; potatoes add $2 for each bushel produced, considering the amount of other crops sacrificed to produce a bushel of potatoes.[3] The enterprise (activity) which has the greatest negative figure is obviously the same one with the greatest price per unit at the top of the table. More will be said later about the reasons for selecting a "nega-

[3] We do not give up any other crop because we have not yet had an active plan. However, the "negative quantity" denoting marginal return need not be the same as the price of the product, with sign ignored, in steps which involve giving up one crop to take on another one.

TABLE 3. EMPIRICAL EXAMPLE IN LINEAR PROGRAMMING, BASED ON DATA IN TABLE 2

Resource for disposal or crop for production

TABLE 3. EMPIRICAL EXAMPLE IN LINEAR PROGRAMMING, BASED ON DATA IN TABLE 2

Resource used or crop produced	Letter to identify	Supply remainder or output	Resource for disposal or crop for production								R
			Land	Cash	March labor	April labor	May labor	Corn	Potato	Oat	
			Price (c) for resource disposal or crop production								
			0	0	0	0	0	1.50	2.00	.75	
		P_0	P_4	P_5	P_6	P_7	P_8	P_1	P_2	P_3	
Land	P_4	100	1	0	0	0	0	.02	.01	.025	10,000
Cash	P_5	5,200	0	1	0	0	0	.50	.80	.25	6,500
Mar L	P_6	190	0	0	1	0	0	0	.03	.05	6,333
Apr L	P_7	200	0	0	0	1	0	0	.04	0	5,000
May L	P_8	120	0	0	0	0	1	.06	0	0	unl.
OC	z	0	0	0	0	0	0	0	0	0	
MR	z−c	0	0	0	0	0	0	−1.50	−2.00	−.75	
Land	P_4	50	1	0	0	−.25	0	.02	0	.025	2,500
Cash	P_5	1,200	0	1	0	− 2	0	.50	0	.25	2,400
Mar L	P_6	40	0	0	1	−.75	0	0	0	.05	unl.
Pot	P_2	5,000	0	0	0	25	0	0	1	0	unl.
May L	P_8	120	0	0	0	0	1	.06	0	0	2,000
OC	z	10,000	0	0	0	50	0	0	2	0	
MR	z−c	10,000	0	0	0	50	0	−1.50	0	−.75	
Land	P_4	10	1	0	0	−.25	− .334	0	0	.025	400
Cash	P_5	200	0	1	0	− 2	−8.35	0	0	.25	800
Mar L	P_6	40	0	0	1	−.75	0	0	0	.05	3,000
Pot	P_2	5,000	0	0	0	25	0	0	1	0	unl.
Corn	P_1	2,000	0	0	0	0	16.7	1	0	0	unl.
OC	z	13,000	0	0	0	50	25.05	1.50	2.00	0	
MR	z−c	13,000	0	0	0	50	25.05	0	0	−.75	
Oat	P_3	400	40	0	0	− 10	−13.36	0	0	1	
Cash	P_5	100	−10	1	0	.5	− 5.01	0	0	0	
Mar L	P_6	20	0	0	1	−.25	− .668	0	0	0	
Pot	P_2	5,000	0	0	0	25	0	0	1	0	
Corn	P_1	2,000	0	0	0	0	16.7	1	0	0	
OC	z	13,300	30	0	0	42.50	15.03	1.50	2.00	.75	
MR	z−c	13,300	30	0	0	42.50	15.03	0	0	0	

tive marginal return" figure.[4] We continue to work through programming steps until negative z-c values do not exist.

We have decided that the first crop to try is potatoes; the largest negative z-c figure is the clue. Now fill out column R, to determine the most limiting resource for potatoes. Column R indicates the quantity of potatoes which can be produced by each particular resource, if other resources were not limiting. It is computed by dividing the resource supplies in the P_0 column by the input coefficients in the P_2 (potato) column. Since .01 acre land produces 1 bushel of potatoes, 100 acres will produce $100 \div .01 = 10{,}000$ bushels. \$5,200 in cash capital will produce $5200 \div .80 = .6500$ bushel, etc. April labor is the most limiting factor. It allows only 5000 bushels of potatoes, if the entire supply of April labor is used.

We now form a second "section" (matrix) of Table 3. It is the section between the second set of horizontal lines. This section is computed entirely from the first section just finished. We repeat the words and symbols in the first two columns except: take out April labor (P_7), since it is to be entirely used for potatoes, and replace it with the potatoes (P_2) for which we use the labor; line P_7 "goes out" and line P_2 "goes in" the vertical stub of the new section (matrix). The top of the table is left unchanged.

Figures in the second section are now computed from the preceding section. The calculations which provide figures to put in the cells of the second section are, in "principle," designed to (a) specify the amount of resources left after the maximum potatoes, allowed by the most limiting resource, is produced and (b) determine the level of return from a particular plan or enterprise. The first line or *row* to be filled in is the one now designated as P_2 or potatoes. It is computed as follows: divide each figure in the P_7, or April labor line of the previous section, by the figure in the cell where the P_7 line intersects the P_2 column. All "new figures" are entered in the new P_2 (potato) line of the o-m section, under the same columns as in the old or first section. The figure in the "intersection cell" is .04. Hence, we divide 200 by .04 and get 5000. This is the bushels of potatoes we can produce and which "enter our plan." It is entered on the P_2 line of the new section, under column P_0. Under P_4, we have $0 \div .04 = 0$; under P_5, $0 \div .04 = 0$; under P_6, $0 \div .04 = 0$; under P_7, $1 \div .04 = 25$, etc. (The ratios computed for row P_2 are transformation or substitution rates.)

Completion of line P_2 (i.e. the potato row) in the new section allows completion of all other rows. The cells for the next rows are computed

[4] Space limitations prevent us from discussing particular problems such as degeneracy encountered in negative ratios.

thus: 1. Find the figure under a particular column in the previous cell; 2. Subtract from this figure the *product* of (a) the figure under the same column but on the "incoming line" (line P_2) in the new section, *times*, (b) the figure under the "outgoing" column of the old section, which corresponds to the row from which we took our first figure. Thus, for row P_4 (land) under column P_0 (remaining resource supply) in the new section, we have $100 - (5000)\ (.01) = 50$; for P_5 under P_0, we have $5200 - (5000)\ (.80) = 5200 - 4000$ or 1200. All remaining cells are completed in this way for the P rows indicated at the left as resources or products. Now compute line OC (or z), the "opportunity cost line": Take each figure on the incoming product line (in this case the P_2 or potato line) and multiply it by the price (c) shown at the top, of the previous section, for the incoming line (i.e., \$2 for potatoes in this case). Enter each figure so calculated (or sum of products, where more than one enterprise has entered the plan) under the respective column on the z line (the opportunity cost line). Now compute the marginal revenue or z-c line: subtract the price (c) shown at the top of each column from the figure on the z line.

Finding the second most profitable crop

We are now ready to find a second crop to add to our plan, or to determine whether we already have the optimum plan. We still have negative z-c figures. Hence, we can improve the plan by adding or changing enterprises. The largest negative figure is -1.50 for corn. Corn should now enter our plan. Compute the R values in the second section, using the same method as in the previous section. May labor is most limiting; it restricts corn to 2000 bushels. Hence, we form a new section for the table, (matrix) between the next set of horizontal lines. The computational steps outlined for the second section are duplicated for the third section. We find a negative $-.75$ on row z-c of the new section, indicating that the most profitable plan has not been attained; enterprise P_3 or oats must come into the plan. The 400, the smallest figure under the R column indicates land to be the "most limiting resource." We form a new section below and replace the land (P_4) row with a new oats (P_3) row. The previous computations are repeated: Line z-c now has no negative figures. We have found the plan of maximum profit.

The figures in the P_0 (supply, remainder or production) column now provide details on the final plan. The P_3 or oats figure is 400; we will produce 400 bushels of oats. The P_5 or cash figure is 100; we will have \$100 unused. The P_6 figure is 20; we have 20 hours of unused March labor. The P_2 or potato figure is 5000; we produce this quantity. The P_1 (corn) figure is 2000; we produce 2000 bushels. The OC and MR (z and

z-c) figures are 13,300, indicating a gross profit of $13,300. This is the maximum gross revenue which we can obtain from the "fixed" supplies of resources with which we started. Since our resources came from "fixed" supplies, the program also gives the maximum net revenue; subtract fixed costs from gross revenue to get net revenue.

If some costs are variable, subtract the variable cost per unit from the price per unit, to get "net price" per unit. Enter the net price, rather than market price, at the heading of Table 3 (as the prices under c) at the outset. Then handle the computation just the same as previously, i.e., use net price rather than market price in calculating all cells for the table. The final result is then "revenue above" fixed costs.

Mechanical instructions

Table 4 provides mechanical instructions, which are simple to follow. This example supposes that there are 4 enterprises and 4 possible limiting resources. Each cell is identified by the number at the left and the capital letter at the top. The prices, for the P columns below, are indicated as c_1, c_2, c_3 and c_4 at the top of the table. The first section must be "filled in" from input-output coefficients such as those in Table 1, A and B. Supposing these to be complete, the instructions in all later cells indicate how to compute the figure for the cell: The cell A7 in the second section is computed by subtracting from the figure in cell A1, the product of the figure in cell A9 times the figure in J1. The figure in cell B9 is computed by dividing the figure in cell B3 by the figure in cell J3. The figure in cell A11 is the figure in cell A9 multiplied by the price c_4 (for P_4) at the top of section 1. The figure for cell A12 is the figure in cell A11; the figure in cell F12 is the figure in cell F11 minus the price c_1 at the head of the column in the first section. These "mechanical instructions" illustrate "uniformities and principles in computations" which are not apparent in the exposition for Table 3.

Logic in mechanical steps

Some brief "logical aids" in the computational steps for linear programming are these: 1. The profit in the z rows must get larger as each new section (matrix) is constructed. 2. The figure for each "non-use enterprise" (disposal) under P_0 in each new section indicates the amount of this resource remaining as the added enterprise is brought into the plan. 3. The figure remaining under P_0, for "real enterprise," which previously has come into the plan as a row, is the amount of this enterprise which can be produced after resources are taken for a second new enterprise. The figure, for a "previous" enterprise which has "come into the plan," will (a) decline if the two enterprises are competitive, or (b) remain unchanged

							c_1	c_2	c_3	c_4	
		A	B	C	D	E	F	G	H	J	
		P_5	P_6	P_8	P_7	P_3	P_1	P_2	P_9	P_4	R
1	P_5	A1	B1	C1	D1	E1	F1	G1	H1	J1	A1/J1
2	P_6	A2	B2	C2	D2	E2	F2	G2	H2	J2	A2/J2
3	P_7	A3	B3	C3	D3	E3	F3	G3	H3	J3	A3/J3
4	P_8	A4	B4	C4	D4	E4	F4	G4	H4	J4	A4/J4
5	z										
6	z−c						$-c_1$	$-c_2$	$-c_3$	$-c_4$	

Note: Prices are written in the tops of the columns as c_1, c_2, c_3 and c_4 for the real enterprises. Prices for the other P columns are zero. The z row is always zero in the first section (matrix). The z−c row is thus zero minus c, or $-c_1$, $-c_2$, $-c_3$ and $-c_4$. In this example suppose, under R, that the ratio A3/J3 is smaller than any other ratio. Therefore, P_7 "denotes" the most limitational resource for activity P_4, which is the most profitable one—assuming c_4 to be the largest negative value

7	P_5	A1−(A9)J1	B1−(B9)J1	C1−(C9)J1	D1−(D9)J1	E1−(E9)J1	F1−(F9)J1	G1−(G9)J1	H1−(H9)J1	J1−(J9)J1	A7/H7
8	P_6	A2−(A9)J2	B2−(B9)J2	C2−(C9)J2	D2−(D9)J2	E2−(E9)J2	F2−(F9)J2	G2−(G9)J2	H2−(H9)J2	J2−(J9)J2	A8/H8
9	P_4	A3/J3	B3/J3	C3/J3	D3/J3	E3/J3	F3/J3	G3/J3	H3/J3	J3/J3	A9/H9
10	P_3	A4−(A9)J4	B4−(B9)J4	C4−(C9)J4	D4−(D9)J4	E4−(E9)J4	F4−(F9)J4	G4−(G9)J4	H4−(H9)J4	J4−(J9)J4	A10/H10
11	z	c_4(A9)	c_4(B9)	c_4(C9)	c_4(D9)	c_4(E9)	c_4(F9)	c_4(G9)	c_4(H9)	c_4(J9)	
12	z−c	A11	B11	C11	D11	E11	F11−c_1	G11−c_2	H11−c_3	J11−c_4	

Check: Alternative method of computing 12 (denoted as 12′)

12′ A6−(A9)J6 B6−(B9)J6 C6−(C9)J6 D6−(D9)J6 E6−(E9)J6 F6−(F9)J6 G6−(G9)J6 H6−(H9)J6 J6−(J9)J6

Note: In this section, assume the "negative quantity" under column P_3, for row z−c, to be largest. Hence P_3 is the most profitable activity or enterprise to "come in" in the next section. Assume A7/H7 is smaller than any other ratio under R. Hence, the resource on the P_4 row is the most limitational and "comes out" in the next step.

13	P_3	A7/H7	B7/H7	C7/H7	D7/H7	E7/H7	F7/H7	G7/H7	H7/H7	J7/H7	A13/F13
14	P_6	A8−(A13)H8	B8−(B13)H8	C8−(C13)H8	D8−(D13)H8	E8−(E13)H8	F8−(F13)H8	G8−(G13)H8	H8−(H13)H8	J8−(J13)H8	A14/F14
15	P_4	A9−(A13)H9	B9−(B13)H9	C9−(C13)H9	D9−(D13)H9	E9−(E13)H9	F9−(F13)H9	G9−(G13)H9	H9−(H13)H9	J9−(J13)H9	A15/F15
16	P_9	A10−(A13)H10	B10−(B13)H10	C10−(C13)H10	D10−(D13)H10	E10−(E13)H10	F10−(F13)H10	G10−(G13)H10	H10−(H13)H10	J10−(J13)H10	A16/F16
17	z	$+\frac{c_3(A13)}{c_4(A15)}$	$+\frac{c_3(B13)}{c_4(B15)}$	$+\frac{c_3(C13)}{c_4(C15)}$	$+\frac{c_3(D13)}{c_4(D15)}$	$+\frac{c_3(E13)}{c_4(E15)}$	$+\frac{c_3(F13)}{c_4(F15)}$	$+\frac{c_3(G13)}{c_4(G15)}$	$+\frac{c_3(H13)}{c_4(H15)}$	$+\frac{c_3(J13)}{c_4(J15)}$	
18	z−c	A17	B17	C17	D17	E17	F17−c_1	G17−c_2	H17−c_3	J17−c_4	

Check: Alternative method of computing 18 (denoted as 18′)

18′ A12−(A13)H12 B12−(B13)H12 C12−(C13)H12 D12−(D13)H12 E12−(E13)H12 F12−(F13)H12 G12−(G13)H12 H12−(H13)H12 J12−(J13)H12

Note: Assume all quantities are positive in row 18. Hence, the most profitable program has been attained. The figures under the P_3 column are now of main concern. For all P rows at the left, which were in the first section, we have disposal, or unused resources. The figures in the cell under P_3 indicate the unused quantity. For all P rows which have come in since the original section (i.e., were only columns and were not rows in the first section) the figures under P_3 indicate the quantity of this activity or crop to be produced for the optimum program. The figure in the last row under P_3 indicates the profit (gross or net as the case may be) for the optimum program.

if the two enterprises are supplementary. 4. The crop with the largest negative figure in the z-c row will add, per unit of product produced, the greatest amount to marginal revenue because: c (its price) is subtracted from z, the opportunity cost or "return given up if we do not produce the product being considered." Since z is the return given up, the "new enterprise" adds to "net opportunity profit" of the plan only if its price is greater than the return to be had by using the resources elsewhere. The opportunity cost (z) minus the price (c) thus must give a negative quantity; the larger the negative quantity, the greater the profit to be had by adding the "new enterprise." 5. The ratios computed, as figures in each new row are entered, denote substitution rates between the crops. In the top section of Table 3, for example, the .04 indicates the April labor requirement per bushel of potatoes. April labor requirements per bushel of corn and oats are zero. Hence, the two ratios $0/.04 = 0$ are entered in the next section indicating that no corn or oats are sacrificed in this particular case, because April labor is used for potatoes. In the first section of Table 3, the coefficients for land, for example, indicate the substitution ratios between potatoes and the other two crops, when the land resource is considered. The substitution rate of potatoes for corn is .02/.01 or 2; the substitution rate of potatoes for oats is .025/.01 or 2.5. 6. The figure under each "real enterprise" computed in a new section as a remainder and product for a cell is the "net expenditure" from the resource stock for the "new enterprise." 7. Whenever there is a zero input-output coefficient in the cell for an "incoming column" (an enterprise which is being added), the row constructed in the new section (matrix), which corresponds to zero, will be the same as the row in the previous matrix.

DISCUSSION

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We are indebted to Dr. Heady for a concise, non-mathematical treatment of the basic logic and computational procedure of linear programming as applied to farm management-production economics. Linear programming is proving to be a valuable tool in many fields. Certainly Heady's paper will serve to introduce this powerful new method to a large group of agricultural economists. I find little in this paper which I consider to be controversial; therefore I have chosen to develop certain points made by Heady.

Heady shows that programming is one of several means of solving resource allocation problems. He points out that programming is basically a mathematical formalization of the familiar budget method. However conventional functions, budgets, and programming need not be viewed as competing analytical tech-

niques. Nor, as Heady points out, are they perfect substitutes. Rather they tend to be complementary methods, for programming tends to maximize the usefulness of data derived from conventional functions and budgets. Perhaps there are problems of production economics-farm management which can be solved by one method as well as another. More often, however, one can readily choose the appropriate analytical method on the basis of probable convenience and validity of results.

The fact that there are several alternative ways to organize and analyze data simply stresses the importance of rigorously defining the problem to be studied and carefully formulating hypotheses. This is the case for the hypothesis to be tested specifies the data needed and dictates, to a large degree, the analytical techniques to be employed. When we "make a survey" or otherwise assemble data in a more or less random fashion, an optimum answer is highly unlikely regardless of the analytical technique employed. Thus I agree that the crucial task of any analytical method lies in the "thinking through" stages.

Linear programming is capable of producing unique optimal answers *only* in the sense that it is capable of selecting the best resource-technique combination from the discrete alternatives considered. Thus the production possibilities surface (choice boundary) may be underestimated because superior alternatives are ignored, or overestimated due to errors of observation or judgment. If the possibilities surface considered is to lie on or near to the possibilities surface set by the state of the arts and available resources, one must exercise extreme diligence and caution in constructing the process budgets. These budgets are in fact the heart of the programming method.

In the program computed by Heady it is assumed that the three processes budgeted represent the range of relevant choices facing the farmer in question. Obviously in "real life" this is not the case, for (1) other enterprises would likely be available, (2) many other resource combinations would produce an equal output, and (3) there may well be complementary relationships between two or more enterprises. In practice these difficulties could be minimized by preparing a larger number of more precise budgets.

The optimum number of process budgets to be considered is a matter of judgment for the research worker. It depends on the number of possible enterprises, the relationships existing among the different enterprises, and the range of alternative production techniques. In general, one should budget more than a single production plan for each enterprise. For example in the program computed by Heady, cash is not exhausted; therefore profits are maximized when MC = MR. However, had cash been a limiting factor, profits could have been maximized only by combining less cash with fixed factors. This possibility could be considered within the framework of the linear model by budgeting two or more points on the variable factor-fixed factor substitution function.

Much has been said and written relative to the limitations of the linearity assumption which characterizes linear programming. However, constant returns to scale is one of the basic assumptions of conventional marginal theory as expounded by modern writers. The curves so prominent in economic text books are occasioned by the law of variable proportions, not varying returns to scale. Furthermore, I am aware of no convincing empirical evidence which indicates other than constant returns to scale for farm firms. However, as Heady points out, if increasing or decreasing returns to scale do exist, the function can be reduced to linear sectors and handled in the linear model. Consequently I

would conclude that the linearity assumption of linear programming does not limit the usefulness of the method in farm management-production economics.

The computational procedure presented by Heady is direct and efficient and certainly his instructions are easy to follow. The section relating the mechanical arithmetic manipulations to commonly used economic logic and terminology is particularly helpful. It would seem desirable to develop a set of instructions to explicitly cover the problem of intermediate products so that optimum crop and livestock programs could be derived simultaneously. This problem can be handled in the process budgets, but such an approach is laborious and time consuming. In applying Heady's procedure it would be necessary to make minor adjustments to suit specific sets of data and problems. For example, if joint product processes where the products are produced in different proportions are considered, the commodity unit basis for expressing input coefficients used would not be appropriate.

There is a need for further development of the programming method by mathematicians and statisticians. For example, as Heady points out, programming as currently used is not a statistical method. Thus there is a need for the development of appropriate stochastic models. Until this is done we will continue to devote too little attention to one of the more important "practical" problems facing farm managers.

Despite the shortcomings of the method, linear programming can be an extremely productive weapon in our fight to push back the frontiers of knowledge in farm management-production economics. The computations are simple, and basic theory and logic long familiar to economists are implicit in the method. A consideration of the logic and power of linear programming leads one to conclude that the mathematical development of the method has forged far ahead of the practical applications in farm management-production economics.

Had time been less limited, I am sure that Heady could have suggested in detail other appropriate applications of the technique. I agree that the method is presently best suited to problems of the firm. However I believe that the generalized programming procedure will prove useful in analyzing aggregative problems and relationships important to farmers. It would appear that the major present limitation of such an aggregative model and approach is the lack of adequate basic data. Linear programming is especially well suited for integrating enterprises and practices into whole farm plans. It is in this area that programming can be most valuable in our research activities. Whole farm planning involves the simultaneous consideration of varied resources of different qualities organized under mixed techniques for the production of alternative products. As Heady indicates, this is a "large scale" problem and it is precisely the type of problem that can be efficiently solved by linear programming methods.

Programming may, as Heady states, be helpful in solving many "micro" farm management problems such as optimum levels of fertilization and feeding. However the technology of agriculture is such that the range of alternative input combinations is virtually infinite. Thus the technology involved does not correspond to the postulates of linear programming. Therefore conventional functions offer the most efficient means of solving this class of "micro" problems. As we turn more to linear programming we must not relax efforts devoted to isolating fundamental relationships by other means, for we will feel a pressing need for such information in the construction of process budgets.

MARKETING

Chairman: P. E. Nystrom, University of Maryland

NEEDED DEVELOPMENTS IN ECONOMIC THEORY FOR USE IN MARKETING

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ONE of the topics at last year's meetings was the appraisal of development in marketing in the last decade. Two tentative conclusions were reached. First, many times marketing research did not seem to be dealing with genuine problems. Second, marketing researchers were not making the good use of present economic theory that they could.[1]

Today the opportunity exists to appraise economic theory in terms of the development needed to make a greater contribution to marketing. This assigned topic implies an assumption which should be made explicit, that is that marketing can benefit from the considerations of theory in general and economic theory in particular. Unless it is believed that theory is a useful guide to inquiry into marketing problems, it is a waste of time to discuss needed developments in theory.

This paper will proceed on the assumption that economic theory has been and will continue to be useful. It will attempt to classify economic theory, to examine in part the content of theory, and to point out the development needed in present theory to facilitate handling certain marketing problems.[2]

Theory may be classified in terms of the broad areas of interest with which economists have concerned themselves to the present time. The first area of economic inquiry is the *allocation of resources* with all the considerations of efficiency which arise therefrom. The second area is the *distribution of income*. The third area of interest has to do with *levels of output and employment*. The fourth area is *economic growth and development*, and the fifth area of interest is on *political-social-legal economic affairs*. In varying degrees each one of these areas has theoretical content. These theories may be further divided into micro and macro categories.[3] Conclusions regarding needed development in economic the-

[1] R. L. Clodius "Discussion—Marketing: Survey of Contemporary Agricultural Economics." *This Journal*, December, 1953.

[2] Throughout this paper the idea persists that operationally theory and research are inseparable. Theory guides research into the analysis of economic problems and as a result of research modifications of existing theory and new theories arise.

[3] For a discussion of the differences see Earl O. Heady "Implications of Particular Economics in Agricultural Economics Methodology" and Sidney Hoos "Implications of Aggregative Theories for Agricultural Economists." *This Journal*, November, 1949.

ory will be reached by examining the limitations of the theories within each one of these classifications with respect to marketing problems.

Resource Allocation-Efficiency

Of all the areas of economics perhaps there is more developed theory here than in any other. It is one of the oldest areas of economics yet forms the basis for most of what has been called "the new agricultural economics."[4] The basic theoretical elements include maximizing behavior on the part of both consumers and producers in society. Out of this comes a theory of the firm, and a theory of consumer behavior. A consideration of groups of firms has led to various models of price determination and to market structure analysis. In addition to the prices of products the prices of factors are determined within this framework. Finally various norms of economic behavior emerge in the form of welfare considerations and public policy proposals.

There are several needed developments in these theories for use in marketing. Since marketing firms are operated by human beings with wills of their own instead of automatons, there should be a greater consideration of the managerial factor in the theory of the firm. Present theories consider the firm as a mechanism. Put in these physical inputs, take out physical outputs, and pay the factors their marginal revenue products. Management just doesn't fit these necessary assumptions of homogeneity, divisibility, and continuity to make this model very realistic or useful for analyzing *managerial* problems. Since the genius of management is most clearly seen over the life cycle of the marketing firm, perhaps the direction in which to move is toward a dynamic theory of the firm in which management's role is strategic.

Related to the above is the simple assumption of profit maximization for the marketing firm in agriculture. Profit is important but it isn't everything even over the long run. The propensity for security, for stability, for power for a firm may be more important in explaining the growth in size of the firm than its cupidity preference. These nonprofit motivations of market behavior need to be studied, classified, and incorporated into the body of theoretical doctrine.

The typical marketing firm is producing not one but many products. However, the typical theory is for a single product firm both in the production and in the pricing of the output. Some new techniques permit solutions to some multiple product problems, but the underlying theory is not happily incorporated into existing theory. One of the real issues which arises in marketing is what to do with marketing services. Should these

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[4] William A. Jones "The New Agricultural Economics." *This Journal*, November, 1952.

services be considered another part of the output of the firm thus making practically all marketing firms multiple output firms? Or should these services be viewed as attaching themselves to the firm's product to form a cluster or bundle of some different product or merely a differentiated form of an older product? In either case the existing economic theory is confusing in guiding inquiry into these problems. The same problem arises in connection with the many shapes, forms, and sizes of packages for what appears to be homogeneous contents. Into what theoretical framework does this fit? Is it multiple output? Or single product but differentiated? In either case the needed theoretical development is rather obvious.

Another needed development for marketing is the integration of the theory of the cooperative marketing firm into the economic theory of the firm. A researcher studying a marketing cooperative hardly knows what to expect to find as to its economic behavior. Does it behave like other firms or does being a cooperative make a difference? The attempt to make a cooperative marketing organization merely a branch plant of the farm firm does not jibe with my own observations of how some cooperatives can come to exist for their own sake almost apart from the member patrons.[5] The needed development here is not further deductive speculation, but realistic theory of cooperative behavior arising out of the study of actual behavior.

Much of economic theory is concerned with "flow" concepts rather than "stock" concepts. But marketing problems frequently involve the creation and use of stocks. Unlike industrial production, much agricultural output appears as a batch. The optimum size of the batch, its location in time, form, and space, are marketing problems without complete theoretical bases although there are some theories on storage. Many marketing firms work from accumulated stocks which become resources to the firm and are variable in quantity, time, and space. Operating from a theoretical assumption that resources are fixed or that the firm can buy all it wants at the given price does not provide too useful a framework for analysis in places where these assumptions are not met. On the output side of the firm is the matter of product inventories as stocks. When and how much should be produced for the market as opposed to the warehouse? Or when the warehouse is full, what are the appropriate decisions to be made about the current flow of marketings as well as of the stock? At the macro level of marketing, the question of stocks held by the government is important. The needed development is a theory of price which incorporates the existence of stocks as idle flows into the present theories of price based on active flows. Even as idle balances or hoards of money affect the rate of interest and the level of economic activity in theoretical

[5] Richard Phillips, "Economic Nature of the Cooperative Association." *This Journal*, February, 1953.

formulations, idle balances or stocks of goods should also affect current activity but the appropriate theory is not available.

Additional theory is needed with respect to the leads and lags of adjustment among marketing phenomena. Little formal theory is available to guide inquiry into the relationship between demand at retail and demand at the farm level and their relative flexibilities of response. The usual concept of supply is an instantaneous net relationship between price and quantity forthcoming under the assumptions of *ceteris paribus*. Marketing researchers suspect that there must be a lag between the stimulus and the output response. Perhaps for greater realism theories should be developed under *mutatis mutandis* assumptions which might reveal kinks and discontinuities in output responses.

For many types of problems in agricultural marketing the norms provided by the purely competitive model do not appear very useful. The same may be said of the recent work on workable or effective competition. Competitive norms should arise out of the analysis of economic behavior. After their conceptualization they may be used subsequently to guide further inquiry into further problems. Somewhere here is the opportunity to develop out of research theoretical norms of behavior which are workable both from the standpoint of economics as well as the law. With such tools the researcher could appraise the realized results within various market structures with the view of making appropriate policy recommendations.

Considerations of policy shift the emphasis to needed developments of macro economic theories. Much marketing and price policy is analyzed on the basis of micro economic relationships and then expanded to the national level without taking into account the process of aggregation involved. The dangers inherent in these procedures could be minimized by utilizing a macro economic theory of resource allocation and efficiency. To my knowledge no such theory has been developed to a state of usefulness. The need is for a theory of resource allocation and efficiency between the agricultural and nonagricultural market sectors of the economy, between foreign and domestic markets, of broad market relationships among industries within agriculture, of the role of such price aggregates as parity and so on. These are the ingredients of some of the most distressing problems in the marketing of agricultural products, but the theoretical tools for analyzing them are sadly weak or suspect.

Distribution of Income

Closely related to theory of resource allocation is the theory of income distribution. Concern with income distribution is also part of the "new agricultural economics" although it was a major concern to an early economist named David Ricardo. Conceptually, income to persons is made

up of the prices received by the factors they own and the quantity of factors owned and used per person. Pricing of factors or functional income distribution is an inherent part of the theories discussed above under resource allocation-efficiency. The part of the theory dealing with the aggregative share of income going to the several participating factors is not included therein however.

Usually marketing personnel are not too much concerned with the income distribution effects of marketing activities but perhaps they should be. There is great faith that the income effect of every marketing change will be to the benefit of producers or consumers or both, but there is little tested theory to this effect. What is needed is an adequate theory of the incidence of the benefits and burdens of specified changes in the marketing of farm products. It should probably be a general as well as a particular equilibrium theory, and might take the form of theories on the effects of taxes and subsidies under current debate in the journals.[6] More adequate theory than presently available would help guide inquiry into such questions as the income effect of improvements in efficiency, the reduction of costs, the adoption of new technology and so on in the marketing system.

On the macro level a theory is badly needed on the determinants of aggregate income distribution between agriculture and nonagriculture and the role of aggregate market prices and quantities in this determination. Marketing men are appropriately concerned with raising incomes to agriculture, but perhaps too much microscopic work under the influence of micro theory is less efficient in doing this job than would be a macro approach. It is possible that some of the empirical work in this field will be the basis for the elaboration of the necessary theoretical development.[7]

A discussion of aggregate income leads naturally to the third area of interest in economics.

Levels of Output and Employment

For the economy as a whole there are two general approaches to the determination of the level of income, output, and employment. One is an equation of exchange type of approach employing the concept of income velocity, rather than transactions, as its characteristic element. The other is the income-expenditures approach, often identified with Keynes, which is characterized by various kinds of multipliers.

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[6] The initial article appears to be E. R. Rolph "The Burden of Import Duties" *American Economic Review*, December, 1946, and the principles have been extended into excise taxes and most recently excise subsidies. The most recent exchange is in the *American Economic Review*, December, 1953.

[7] Trygve Haavelmo "The Interdependence Between Agriculture and the National Economy." *This Journal*, November, 1947. Karl Fox and H. C. Norcross "Agriculture and the General Economy." *Agricultural Economics Research*, January, 1952.

At the macro level in marketing there is need for a theory of the interrelationship between agricultural and nonagricultural outputs and employment. The concept of an agricultural multiplier would be useful. The theory should also include a specification of the propensities to spend by farmers integrated with the propensities to consume farm products of marketing agencies and consumers. The multipliers associated with each of these propensities would be useful in determining the aggregative effects of changes in marketing. It is conceivable that marketing research to disclose the most effective means for applying a leverage effect to the maintenance of aggregate demand and full employment would be more useful to agriculture than research oriented solely to resource allocation problems.

In many marketing circles the increased costs of distribution are viewed with alarm. An aggregative income theory as proposed might suggest that micro economic costs are income payments in the aggregate and contribute to the effective demand for agricultural products. Thus they may not appear so black on second view.[8]

Economic Growth and Development

In this area there exist pieces of theory, some on the growth of national income, some on innovations, some on the development of underdeveloped areas and the like. In order to be of greater usefulness in marketing, theories of growth and development need to be improved at both the micro and macro levels of analysis. In problems involving firms, their products, their marketing channels, there is great need for a theory of change. If a marketing agency stands still to meet the assumptions of the model, it is almost sure to fail. Marketing firms must grow, develop, change, innovate, and adjust because that is the world in which they live. One of the greatest challenges facing the marketing researcher, and the social scientist generally, is the analysis of this process. There are marketing problems of the growth in scale and concentration of marketing firms, innovations in packages and packaging as well as in products, innovations in handling materials, changes in the importance of central and country markets, changes in consumer's tastes and habits, and so on. Such a listing emphasizes the need for adequate theories which will assist in the understanding and the analysis of these changes and the adjustments to them.

At the macro level further work is needed on theories of growth and development in the several sectors of the economy which market their

[8] This assumes that the increased costs are not due to increasing inefficiencies in the use of resources or to increased monopolistic exploitation. Another way of looking at the aggregative phenomenon would be to say that additional production or output is being created since in the aggregate, costs are payments to factors (income) and equal to the value of output.

goods and services to one another. Perhaps these same theories could be extended to the agricultural countries of the world. They might provide useful guides to such problems as comparative advantage, foreign competition, as well as foreign markets. Also a theory of development which would lead to realized results in terms of increased production and marketing of food and fibre in the underdeveloped areas of the world would be extremely useful in taking the initiative away from the proponents of theories based upon the thesis, antithesis, and synthesis of Karl Marx.

Political-Social-Legal Economic Affairs

Marketing problems arise in a society which contains both political parties and laws. The social organization, the politics, and the laws are parameters with changing values rather than constant values. It would be highly desirable if these factors could be incorporated within a framework of economic theory. It requires recognition of the human element as the entrepreneur in the decision making process, as the consumer affected by religion, sex, and politics. It requires recognition of the government as an active economic agent. It requires recognition of pressure groups, lobbies, labor unions, and economic power in the market place. Such a theory would provide a guide in getting people to work together, in getting people to work for and to accept changes in the marketing system. Certainly the development of such a theory would require great cooperation among the several disciplines. Perhaps it is too ambitious. But the need is there.

Summary

A summary of needed developments in economic theory for use in marketing would include the following:

1. More micro theories in areas now dominated by macro theories and vice versa.
2. Truly *general* theories which would integrate both micro and macro economics and the operations of the various sectors of the economy.
3. More dynamic theories incorporating change as the basic element.
4. More consideration of the human element and the social organization.
5. Theory in operational terms so it can be used. This should include operations of the actors or agents as well as of the functions.
6. More adequate theories of the short run because it is here that often a quick answer is needed.

A final needed development refers not to theory but to the greater realization on the part of marketing people of the role of theory in solving problems. The development of tool users must parallel the development of the tools themselves.

DISCUSSION

ADLOWE L. LARSON
Oklahoma A. & M. College

Marketing needs consideration of the type of material presented in this paper. Not only is there a need for an adaptation of existing economic theory but there are many economic theory vacua in the marketing area. The approach taken by Professor Clodius is that of one having a wide knowledge and interest in theory and more significantly that of one who wants to use that theory in understanding and interpreting markets.

While the paper is divided into five parts, that relating to resource allocation-efficiency receives major attention. This is not unrealistic since most of us are working in this area. My discussion is divided into two parts—one concerned with efficiency, which I shall emphasize, and the other the remainder called here "general market areas."

Resource Allocation-Efficiency

The suggestion that more attention be given to management factor in theory is timely. Far too much of our work neglects this area—mainly, I expect, because dealing with it is difficult. We need explanation of the how and why of management including the effects of the varying combinations and balances of managements elements.

Non-profit motivations need theoretical understanding. Most of us are aware that firms, and even college professors, consider much more than profit maximization in making economic decisions. It may have a big or a small part in our scheme of maximizing all values. Neither are we robot calculators coldly setting up our every economic move. Undoubtedly the institutional approach has something to offer in this area.

The suggestion that better theory is needed for multiple-service-product firms can stand emphasis. Because of inadequate theory our work on the analysis of operating firms tends to be over-simplified. Our study of multiple vs. single unit elevators emphasized this need to us.[1]

The status of cooperative firm theory remains uncertain. I feel that it is not as far advanced as some maintain and yet there have been real advancements in the last twenty years. Certainly the cooperative firm is different from the non-cooperative. The individuals and the firms making up the larger firm may have different motivations in the two. We do need an understanding of the "marketing preferences" of farmers—their preferences in the markets in which they sell or might sell.

The criticism that theory does not explain why cooperatives or some parts of them might be operating contrary to the interest of the members of a cooperative can also be made in the non-cooperative area. Perhaps this is no fault of theory but just of poor operation or inadequate checks. Are cooperative and non-cooperative firms a result of differing individual personal characteristics or of differing combinations of them?

A suggestion is made that use be made of "stock" instead of "flow" concepts

[1] Adlowe L. Larson and Howard S. Whitney, *Relative Efficiencies of Single-unit and Multiple-unit Cooperative Elevator Associations,* Oklahoma Agricultural Experiment Station Bulletin, No. B-426, June, 1954.

since much production is in chunks. Certainly we need to adapt our thinking to both. Perhaps an analysis based on one but recognizing aberrations would be preferable such as: (a) a flow which allows for "lumpiness" caused by nature, cost, and other characteristics, or (b) a series of stocks which may even approach a flow.

The suggestion that more attention be given to theory concerned with lags and leads in market phenomena may be considered as a part of problems associated with but not caused by time. An illustration is the relationship of fixed and variable costs to time—the varying shapes of the fixity-gradient curves and their effects upon firm operations.[2]

There is a need for a better understanding of the effects of time on demand, supply, pricing, etc., instead of just instantaneous concepts or time graphics. In our study of changes we need to know more about the explanations as well as measurements of rates and accelerations (dampening effects) and their results in varying combinations.

The suggestion is well made that macro theory of resource allocations be used for policy. That used for policy now shows little improvement over the time of Adam Smith. One cannot help but wonder if we are limited to "micro" and "macro." Now they are as popular as "charcoal" suits but did not we call them "oxford grey" twenty five years ago?

It seems that much can be gained through the building of theory which will permit and encourage more and new uses of objective analyses of marketing problems. The area is wide open for the development of standards and measurement devices such as stresses, potentials, resistances, gradients, and safety factors. Or we might develop a combination measuring device not unlike "entropy" in thermo-dynamics. Developments along this line will allow us some of the gains which come in manufacturing through "interchange of parts," "transfer of skill," and specialization. It does seem odd that because of the lack of this almost every research project must be a "custom" job.

Coupled with this is the need for more understanding of the possibilities of mathematical analysis. This is not limited to 100 simultaneous equation systems solved by electronic computers but includes problems requiring the use of two or three variables and equations or of trial and error procedures. We have been naive in our understanding of consumer preferences. We need the help of others in determining the motivation factors and their intensity for individuals and groups. Likewise we want to know the effects of leadership (as in leadership patterns) such as Lundberg discussed in his Parlin lecture.

General Market Areas

The section on resource efficiency was followed by short discussions relating to distribution of income, levels of output and employment, economic growth and development, and political-social-legal economics affairs.

That there is much need for the development of economic theory in these areas for marketing use cannot be denied. Pointed out in the income discussion was desire for knowing the income effects of changes in marketing costs, changes, efficiency, and technology. Similarly the need at the marcro level was presented for theory determining aggregate income distribution between agriculture and non-agriculture.

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[2] Adlowe L. Larson, "The Fixity Gradient: A Tool For Fixed and Variable Cost Analysis," *This Journal*, Vol. XXVIII (August, 1946), pp. 825-834.

The discussion of output and employment brought out the need for an agricultural multiplier. Such a development would have a very practical use.

We need certainly a better explanation of change, including growth and decline. Observation of a firm or a group of them may have called this to your mind, but understanding may be more needed at the macro level.

The final section suggests the desirability of integrating economic theory with other activities about us. This seems to be an expanded idea of "institutionalism." I would be among the first to agree that it is needed.

LINES OF ADVANCE IN RESEARCH IN MARKETING

JOHN D. BLACK
Harvard University

RESEARCH in the marketing of farm products has been under challenge to make strong advance ever since the Agricultural Research and Marketing Act was passed in 1946. The passage of that Act was the culmination of a strong drive begun in the latter 1930's by Democratic Congressman Fulmer and Republican Congressman Hope, in turn chairmen of the House Committee on Agriculture, and a group of fellow Congressmen, to shift the emphasis in agricultural reform back to marketing, where it had been from 1920 to 1933. These Congressmen were thinking of action more than of research, but were ready to include the strengthening of research and education—education of producers, middlemen, and consumers—as one part of the program. The Act of 1946 got through Congress because it was the part of it to which there was least of objection. Scarcely anybody opposes research and education except when they get to thinking about what they cost and appropriations and taxes.

The action in the field of marketing that leaders like Hope and Fulmer had in mind was never too clear. No doubt the larger part of it would come under the head of regulation and services. Some of it would come under the head of marketing reorganization. They no doubt were also ready for some forms of government operation. It is clear from their speeches that the two ideas dominating their thinking were, first, that the spread between farm producer and consumer prices is altogether too wide, and, second, that included in this wide spread are some unreasonably high processor and middleman profits, probably monopolistic in origin. The strong emphasis on research in marketing spreads in the Act of 1946 also supports such a conclusion. A letter which I received from Congressman Fulmer after a visit to his state in 1939 was couched mostly in terms of the monopoly profits of the middleman and processors. He was disgusted with my letter of reply in which I suggested that the main reason that the spreads were so wide was that so many firms, most of them small, had managed to crowd into the marketing field, and were making a sort of living out of it, mostly not a particularly good living, and that cutting profits in half would not add more than a few percent to farm prices.

It will be remembered that at that time the farmers were getting only 38-39 percent of the consumers' food dollars as compared with 45-46 percent in 1910-14. We economists at that time were likely to attribute this decline to the fact that middlemen and processors had had to absorb a doubling of urban wages coming out of World War I. It is now apparent

that nothing more than the then low level of farm prices was the larger reason for it. With farm prices at wartime and 1946-48 levels, the farmers' share rose toward 55 percent in spite of rapidly mounting urban wages. With farm prices around 100 percent of parity not long since, the percentage became 45-46 again, the same as in the 1910 base period.

Limited Results from Marketing Research

Whatever the motivation for the Act of 1946, it is now evident that achievements under it have not measured up to the hopes of the sponsors of it, since very little of the authorization in the Act for multiplying the support for it in succeeding years has been followed up with actual increases in the appropriations. It is time that we take stock and ask ourselves the reasons for this.

The first is, of course, that research and education produce their effects only gradually even in the natural sciences. The research that finally gave us hybrid corn was begun before World War I. It will be a long time yet before the rank and file of farmers are using the hybrids in effective combination with other factors and generally getting yields around 80 to 100 bushels.

Second, much of the best marketing research does not produce spectacular and specific results like hybrid corn, or control of plant lice on potatoes.

Third, the agricultural experiment stations and other research agencies were not adequately equipped to take on this expanded program of marketing research. They did not have the personnel for it in the first place. A review of the projects financed by these funds that was made by the Agricultural Research Policy Committee about 1950 revealed that a major part of the actual detail of the research was being done by research assistants with only a B.S. degree. A parallel review of graduate teaching in marketing in the agricultural colleges showed only a small number of courses on a strictly graduate level, and a paucity of teaching materials at this level. The B.A.E. had only a very small staff in this field.

I think that I shall have to add as a fourth reason that such leadership as there was for such a research and education program did not usually have the grasp and comprehension of the marketing problem as a whole needed to lay out a research and education program that would tie in with the action and services and market reorganization that was in the mind of the sponsors of the Act of 1946.

Lastly, it now seems clear that the leadership in the U.S. Department of Agriculture was inadequate at the time. One reason for this was that the conduct of the organization of this research was more or less split three ways, among the B.A.E., the P.M.A., and the A.R.A. and its prede-

cessor. All of this time there was pressure from a strong group in Congress to have set up a separate marketing administration that would combine action and research and what-not else. This group at least partly achieved its ends in the recent reorganization of the Department. We shall all observe with intense interest how successful it is in developing an integrated action, research, and education program in the marketing of farm products. Speaking as of the years 1946 to 1953, however, much more in the way of such unification and integration could have been achieved if there could have been set up in the Department an overhead unit that had general direction of the research and education in marketing financed under the Act. It could have called together the leading thinkers and researchers in this field in the United States and over a period of several months developed a master plan into which could have been fitted the R.M.A. research and education work of the U.S.D.A., the state experiment stations, and some other institutions and agencies. This group would need to have kept closely in touch with the action activities of other branches of the federal and state governments in the field of marketing and pointed much of its research along lines designed to make these activities more effective.

Desirable Types of Research

In what follows will be particularized the lines of research which such a group of leading thinkers and researchers would be most likely to single out for attention if it were functioning today. The discussion will be limited, however, pretty largely to marketing narrowly defined, not including price-making and demand.

First, such a group would recognize the distinction between several types of marketing and processing firms making up a marketing system and marketing systems as wholes, and devote relatively more attention than in the past to the latter. It is changes in the latter that have affected marketing most in the past several decades. To demonstrate this, I need only refer to the growth in the private field first of the chain-store systems and later of the supermarket systems, and of some parallel growths in the cooperative field. The spread between producer and consumer of food has not widened since 1910-14, but think how much more this includes in the way of length of haul, refrigeration, processing and preparation for eating, packaging, and display than the same percentage spread covered in 1910-14. Credit for this must be given in large measure to the development of these systems. Research in this line should have for its main objective the singling out of the operations, practices, and details of organization that have contributed to the gains and savings of progressive marketing systems and analyzing these from the point of view of discovering why they have

done so and what about them could be introduced into now unintegrated marketing systems. Comparisons with these operations as performed by independent marketing firms may prove illuminating. Some of the operations thus singled out and analyzed may be such as can be adopted by cooperatives and other integrated systems.

Another type of research of marketing systems as wholes is that in which the handling and buying and selling of the product all the way from the producer to the consumer is analyzed step by step. This may call for production-economic analysis of each of the types of firms involved, but should also allow for such alternatives as shifting a function or operation from one type of firm to another. We are fortunate in having an excellent example of this type of research in R. G. Bressler's *City Milk Distribution* and the series of milk marketing studies by the Connecticut Experiment Station.

Of the functions or operations needing analysis from this point of view, buying and selling are most neglected, and theoretically capable of yielding the largest gains. But few examples of research in this line can be cited.[1]

The situations in which research in marketing systems as wholes and marketing organization is likely to be most productive are those in which changes are under way that call for readjustments in marketing. These may be changes in production, transport, processing, distribution, or consumption. Examples of changes in production that serve as illustration are the shift toward livestock in the South, or away from so much cotton or small grain in some parts of the South or West, or toward more poultry in an area. The arrangements for selling cattle that now prevail may be very inadequate as cattle numbers double and treble. It will not be more auction markets that are needed, but fewer of them much better organized and better located. The North Carolina group has recognized this clearly. The shift away from cotton may call for substituting a few modern efficient cotton gins for many more out-dated ones. The change from hand to machine picking of cotton may also call for revision of ginning and marketing.

How transport and related factors may call for reorganization is illustrated by an experience in Minnesota in the 1920's. It became evident that with modern facilities for hauling milk to creameries larger creameries with higher-priced buttermakers were needed. An analysis for one county suggested a program for consolidating its 26 creameries into eleven. But the program was never released to the public—the higher-ups ruled that

[1] See No. 2-H, Harvard Studies in Marketing Farm Products, *Research in Selling and Buying* by Ottar Nervik and John D. Black.

the project was too hot to handle. The county now has less than the eleven creameries.

The University of California has just completed a study of long-haul truck transportation of California fresh fruits and vegetables, the summary of which concludes with the following paragraphs:

"It must be recognized that the impact of trucking on fresh fruit and vegetable marketing has been wide and deep. The industry does not accept a new system of transportation and leave everything else as before. The impact on competition within the produce marketing industry is fully as significant as the impact in other industries because trucking means advantages for new firms, new ways of doing business, and new geographic areas. Today, there is a revolution in produce marketing under way, the outcome of which cannot yet be seen, and trucking has played its part in getting this revolution under way.

"Lower transportation costs are but part of the story. Growers, shippers and consumers all benefit from them. But the railroads will continue to dominate in the more distant markets and others which they are particularly well set up to serve. The net effect should be an improved product on the table of consumers and an expanding total demand for fresh fruits and vegetables encouraged by more adequate supplies, greater variety in more stores, and better quality."

The prepackaging of vegetables illustrates another type of situation calling for research, particularly because of its impact on their production. Its general effect at present is to force out of existence the local smaller-scale producers of these vegetables. The prepackers need volume and standardization of product. Strong leadership and education and pilot-operation type of research is needed to save the day for the local producers.

Related to the foregoing is analysis of the possibilities of new developments in processing and distribution such as of milk powder in consumer packages or of concentrated fresh milk. We cannot take it for granted that even our integrated marketing firms will always consider that such developments are sufficiently in their short-run interests to make the necessary investments in them.

Very much in need of such analysis at present is the distribution of skim milk, not a new product, but one coming into increasing use. In Boston, its retail delivered price is the same as that of whole milk. The University of Connecticut is to be congratulated for its pioneering effort in this field. Developments of this kind have different possibilities in different consuming areas.

Some of the foregoing point to a great general need for research in situations in which producers and distributors need to work together to their common advantage, to the end that the type of product and form in which it is delivered to market are those which represent the best combined advantage of the two. It does not always pay producers best to

produce and deliver exactly what the primary receivers would most like to have, and contrariwise. Once the analysis is made, the foundation is laid for a strong educational program.

The parallel situation on the buying side is that of determining the type of food, fertilizer, or other farm supplies, or size and type of machine, that different groups of farmers can use to best advantage and then fitting these into the business of the local dealers. This calls for a joint research of production and marketing economists.

For such research, and part of that outlined in the foregoing, analysis is needed of the production economics of individual firms. I scarcely need to say that there is also a continuing place for such research for the usual ends of such research, namely, to point the way toward more efficient operation of these units. But some revision of the more usual objectives, analytical procedures, and presentation of the results is needed. The major use of the results should surely be to provide guides toward reorganization of these units and information that can be used in planning such reorganization, much of the same sort as that now being provided for use in individual farm planning. The basic economic theory is, of course, the theory of the firm, but for use in educational work with the operators of these, the theory needs to be reduced to the simple concrete terms of budgets of receipts and expenditures of the units as now operating and of alternative organizations. For many such units, the slope of the demand for the services or products sold will be important as well as the input-output curves. The published results will be more useful if they include presentation of operating layouts and budgets for several of the more common modal types in the area or region—types varying as to size, combination of products handled, and the like. These will be much in the nature of economic models, but not too abstractly so, let us hope, if they are to be used in educational programs.

Such research will be particularly useful if the modal types and models are for units of a sort that fit into new marketing situations such as described above; for example, if they are of livestock or poultry auction markets of the sort needed in a developing livestock or poultry area.

Under this general head comes the research and accompanying planning of produce markets to which Mr. Crow has been devoting his efforts. The relationships involved in such setups are comprehensive and some of them pretty complicated. They have become more so in recent decades because of new developments in more direct chain-store and supermarket buying, frozen food, prepackaging, and the like. These have taken over so much of produce marketing in the Boston market, for example, that what is left is becoming dispersed over the city. It may be that the disruption of the old Faneuil market by running an elevated highway through it has only

hastened this outcome. At any rate, I am looking forward to some comments from Mr. Crow on the Boston and other produce market situations and the research needed in connection with them.

Attributes of These Suggestions

There is one common attribute of all the research outlined thus far, namely, that all of it is constructive—that is, that it contributes toward the shaping and fitting together of the building blocks of improved marketing structures. The individual marketing firms are the lowest order of building blocks in these structures. Economics in the last decade has been taking on more of this constructive character. Perhaps this is an accompaniment of its growing concern with the economic development of underdeveloped countries. At least in my own case, I have found my economic mind thinking more constructively than before as a result of spending a couple of months recently in thinking through the problems connected with the development of India. It is also significant that the study of the distribution of food in Puerto Rico, undertaken by Robert Branson and Richard Holton under the direction of Dr. Galbraith, culminated in a plan for evolving a new marketing structure that would reduce the spread by nearly one third according to their estimates.

Another attribute of the research outlined so far is that it is related pretty closely to action, first, that of private marketing firms, and second, that of public agencies operating in this field. The latter raises the question as to whether what may be called operating research should be done by the public operating agencies themselves or by research branches of government experiment stations, or outside research groups. There surely is a place for some types of research conducted by researchers working within such agencies, but the major part of it should be in the nature of undertakings jointly with groups specializing in research. Operating agencies should be assisted increasingly by analysis of their operations and effects thereof. Good subjects for analysis are milk markets operating under federal orders, price reporting services, and regulation of produce exchanges.

Another consequence of working in countries less developed economically is to make one more conscious of the importance of the kind of communication that is needed to make markets conform more nearly to the economist's definition of a "perfect" market. One of the greatest needs in marketing research in a country like India is that which will help to bring markets in different parts of the country in closer alignment with each other, and likewise prices received in one market on the same day, and prices at harvest time and later, through grading and inspection, price reporting, and other market information services. One comes to

realize that, after all, the major part of public effort in marketing of farm products in the United States is still directed toward making the markets more nearly perfect, that is, more truly competitive.

The other close tie-in in the research outlined is with extension education. A large part of the value of research in marketing is lost unless the results can be made meaningful to producers, processors, and distributors generally, and this requires that they must be helped to see the application of them to their own operations.

Very little is said in the foregoing about research in cooperative marketing as such. Cooperatives commonly lend themselves better to research along the lines defined than do private marketing firms, and even more important, can become channels through which to reach more effectively the producers who are their members. There is, however, one aspect of cooperative marketing that I would like to see explored much more fully, namely, what it is that a cooperative substitutes for the buying and selling expenses of competitive private firms, and how useful these substitutes are, for it is this that furnishes most of the reason for cooperative selling and buying.

Finally, I would not want anyone to conclude that there is no place for study of marketing spreads or margins. We need not only to keep close watch of them by setting up procedures for measuring changes in them, but also to account for these changes. This will sometimes point the way toward important research projects needing to be undertaken. But margin studies cannot be expected to produce "atomic bombs" that will blow our present marketing system into bits, as one former member of the A.R.P.C. Committee used to insist.

DISCUSSION

WILLIAM C. CROW
Agricultural Marketing Service

Dr. Black has pointed out the impetus given to marketing research by the Research and Marketing Act of 1946. He has also shown that this Act was the result of a marketing investigation by the Committee on Agriculture of the House of Representatives which extended over nearly ten years. During the early part of this investigation, under the leadership of Congressman Fulmer, the objective seemed to be to find the *specific* changes that were needed in the marketing system in order to make such changes by *law*. As the investigation progressed, under the leadership of Congressmen Flannagan and Hope, it became evident that improvements in the marketing system could not be made by the enactment of some bill to cure the ills. Instead, it was concluded that such improvements would have to come through continuous research, study, and experimentation in marketing similar to the methods used so successfully to improve production. To accomplish this the Committee drew up a bill author-

izing the Department of Agriculture to bring its marketing work together in one agency which would work with State agencies, other research institutions, and marketing firms in finding improvements in marketing, and bringing about their adoption.

In my opinion, Dr. Black is correct in his statement that the achievements under the Act have not measured up to the hopes of its sponsors. He pointed out that this lack of achievement was due in part to the failure of the Department to provide the leadership in marketing which the Act had intended. Instead of bringing its marketing work together in an agency which would devote its whole energy to marketing problems, the marketing activities of the Department were scattered among many agencies, each of which had other responsibilities that had prior claims to its attention. At one time these activities were spread among at least a dozen different agencies in the Department. Strong leadership in marketing of course could not be developed in this way. This lack of leadership undoubtedly was partially responsible for the failure to bring together the leading thinkers and researchers in marketing to develop an outline of a well-rounded research program. Instead, individuals and agencies throughout the Department, the States, and industry began to turn in proposed projects. Such an approach resulted in overemphasis of some subjects and ignoring others. It was difficult to prevent lack of coordination and duplication. Thus the results of marketing research vary widely among commodities, component parts of the marketing system, problems dealt with, and agencies carrying on the work. The regional approach to marketing problems has been particularly deficient.

Many of these shortcomings of marketing research are growing pains that are usually found in the development of a new program, the success of which depends upon the combined efforts of so many groups. Our dissatisfaction with the achievements can be constructive only if it spurs us on to do a better job. Dr. Black pointed out many fields that need attention; but lest we appear too pessimistic over our accomplishments, mention should be made of some worthwhile results of marketing research conducted in the Department, in Experiment Stations, and by other institutions.

During the past few years marketing research people have developed many improvements in both equipment and methods for handling products at various points in the marketing channel. Many agricultural products are handled 25 to 30 times—one package at a time—as they pass through the distributive channel. Marketing costs have risen largely because of increased wages, so if costs are to be held down, labor productivity must be increased. Much has been done to find ways of reducing handling costs, in apple-packing plants, cotton and refrigerated warehouses, milk plants, and wholesale and retail stores. One piece of equipment developed in a study of handling in apple houses in Washington reduced the labor required for the operation by 75 percent. Improvements in methods and equipment for handling cotton into, within, and out of warehouses are credited with annual savings of several million dollars. New equipment and methods point the way to significant savings in handling groceries, meats, and produce in retail stores; eggs in assembly plants; frozen food in distributors' warehouses; and milk in milk plants. More important even than the savings is the fact that the work done proves conclusively that much can be accomplished throughout the marketing channel by reducing the number of times products are handled, and by improving the efficiency of such handling operations as cannot be eliminated.

Research people have developed plans for better marketing facilities at many

points in the marketing system, and in more than half the places studied, new facilities have been built or are under construction. Through operating in the improved facilities, costs have been decreased, deterioration and spoilage have been reduced, and in many instances the volume handled has expanded. Annual savings of several million dollars have resulted from the new marketing and storage facilities that have been developed. Information needed to determine the best location, design, equipment, and method of operation of marketing facilities for all kinds of farm and food products is steadily increasing.

Another fruitful field in which much has been accomplished is that of finding ways to preserve the quality of products as they move through the marketing system. By maintaining the proper temperature immediately after harvest it is possible to prolong appreciably the life of potatoes. Determination of optimum temperatures for holding tomatoes for ripening has reduced deterioration and spoilage, and given consumers a better product. Better methods of loading watermelons and cantaloups in railroad cars have cut breakage by at least two-thirds. A new material on the floors of trucks will materially reduce injury to livestock. There are tremendous opportunities for reducing loss and damage to products as they move through the distributive system.

Some very worthwhile work has been done in developing ways to improve the pricing of dairy products, both at country plants and in the large consuming areas.

One of the most significant advances in marketing research is the increased acceptance of research people, their ideas, and their findings by marketing firms and agencies. This is probably due to the participation of industry people in planning and carrying out marketing research programs, to the pressure to find ways of reducing costs and expanding outlets, and to the increased willingness of marketing research people to deal with practical problems. It is a hopeful sign that all marketing research in some agencies is being done on the request of industry. Many firms are actively participating in such research, and making financial contributions to it. Such cooperation is essential because the facilities of marketing firms are the principal laboratories in which marketing research must be done.

It is impossible in a brief talk to mention all the significant advances taking place in marketing research. Improvements are being made in the techniques of marketing research, such as progress in price-analysis methods, determination of ways to find out what consumers want and why, and better application of sampling methods and experimental design. We have learned that many marketing problems are solved by the combined efforts of economists, marketing specialists, statisticians, engineers, biologists, transportation experts, and persons with many other skills.

As we look back over the past few years, we see that many mistakes have been made, and that there were many hindrances to progress in marketing research. Still it is easy to record results that bring annual savings many times as great as the cost of the work. The advances that have been made point the way to improvements in marketing that can measure up to the expectations of the fathers of the Agricultural Marketing Act. The full value of the accomplishments of the past few years will be determined largely by the success of future programs that are built on the foundation which has been laid.

PROGRESS IN DEVELOPING A SET OF PRINCIPLES IN THE AREA OF CONSUMER BEHAVIOR

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IN recent decades some might say that we have retrogressed rather than progressed in the development of principles for understanding the economic behavior of consumers. Thirty or forty years ago the principle that consumers seek to maximize "utility" was generally accepted as furnishing an adequate explanation of their behavior for purposes of orthodox economic theory. Today this principle is widely criticized as an inadequate, perhaps wholly false, representation of consumer motivation, and as being useless from an operating standpoint anyway because utility is not a measurable entity on which quantitative analysis can be based. We have rather generally lost confidence in it, but we have not developed any comparable conceptual structure to replace it.

Concepts of the Classical Theory

Certainly the utility principle furnished a convenient foundation, on the consumption side, for the whole structure of classical economic theory. It served equally well as precept, prescribing how consumers ought, rationally, to act; and as natural law, describing how they do, in general, act. From the principle of diminishing marginal utility was derived the downward-sloping demand curve. From this, combined with the upward-sloping supply curve, itself the derivative of increasing marginal disutility, plus some assumptions of perfect competition, was derived the constant tendency of the economy towards a stable equilibrium in which optimum use is made of all resources—optimum, that is, if we accept also the implications for equity of the principle that resources ought to be paid according to their marginal productivities.

The difficulty that no one could devise a way of measuring utility was overcome by the discovery that it need not be measured anyway for purposes of theory. All that is needed is the preference pattern of the consumer—his indifference diagram. We need only to know which the consumer would rather have, not how much rather.

Psychological studies, of course, cause some to doubt whether consumers even have consistent preference patterns, or can reliably tell us of them if they do. F. V. Waugh, on the other hand, has devised an indifference function giving an excellent fit to some market data.

The most elegant and complete mathematical formulation of the equilibrium theory was given us by Hicks in 1939.[1] But the essentials of the

[1] J. R. Hicks, *Value and Capital*, Oxford, 1939.

theory are nowhere more charmingly and convincingly presented than by Wicksteed in his *Common Sense of Political Economy*,[2] first published in 1910. " 'Second helps are never as good as first,' said a child, with a deep sigh, when she had finished her second plate of jam-roll. The pudding may be the same, but the child is different; for to the second help comes a child who has already had a first help—that is to say, an organism which can no longer enter into the same reactions with jam-roll as before."[3] Or the picture of the housewife deliberating "whether she will want three loaves of bread or four, or three loaves and a twist, or three white loaves and a half-loaf of brown . . . ,"[4] or the countrywoman drawing up her order for supplies from a London store and by degrees pruning it down to a justifiable amount. Such illustrations are as delightful as they are effective in illustrating the principles he is expounding.

Actually, Wicksteed anticipated most of the present-day criticism of the theory. He recognized that the consumer's economic calculus was not complete, but that a great share of our purchases are made with only foggy notions of our alternatives, or even are made with no deliberation at all. "A girl is conscious of choosing between a number of hats in a shop, but she may hardly be conscious of choosing between a hat and something else. She never gets a hat unless 'she has to,' and then there is no choice in the matter. . . . But to say all this is merely to say that our scale of preference often asserts itself automatically. Life would be impossible if we were always in the state of mind professed by the lady who said she liked 'to get up every morning feeling that everything was an open question.' We are not obliged to be constantly considering alternatives, because in a fairly well regulated mind the suggestion of any particular item of expenditure does not as a rule arise until it is approximately in its proper turn and place for gratification. . . . If we are moderately wise we pretty generally act without reflection in the manner which reflection would have dictated. But these unconscious and automatic processes are far from being infallible. . . ."[5]

Wicksteed likewise recognized that our actions are often impulsive or irrational, and that we are often unresponsive to stimuli. "Habit or impulse perpetually determines our selection between alternatives without any reflection on our part at all; and the terms on which alternatives are offered us may change within wide limits without affecting us. But if they are

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[2] References are to Philip H. Wicksteed, *The Common Sense of Political Economy and Selected Papers and Reviews on Economic Theory*, ed. by Lionel Robbins, London, 1933.

[3] *Ibid.*, p. 40.

[4] *Ibid.*, p. 42.

[5] *Ibid.*, pp. 35-36.

altered beyond a certain point the habit will be broken or the unconscious impulse checked, and we shall enter a stage of conscious choice. . . . A man of given temperament and accomplishments, who without a moment's hesitation would take a header of 5 feet to help a drowning stranger, might be conscious of a conflict of two forces in him, though hardly of a deliberate choice, as he took off from a height of 8 feet, might nerve himself with an effort to a 10-foot throw, might refrain, though with some measure of self-contempt, if the height were 12 feet, and without any self-reproach at all if it were 20 feet. . . .

". . . We lie awake (or what we call awake next morning) half the night consciously suffering from cold, when without even getting out of bed we could reach a blanket or a rug which would secure comfortable sleep for the rest of the night. We cannot say that we deliberately prefer the discomfort we have encountered to the discomfort we have escaped. Perhaps the psychological analysis is that we prefer each second of the discomfort of cold, as it comes, to the discomfort that would accrue during that second if we secured peace for the rest of the night. At any rate our choice is irrational. . . ."[6]

He likewise brings out, as befits a Unitarian Minister, the importance of non-material considerations and motives of generosity and devotion, as well as the influence of desire for show and social prestige in forming our preference scales and dictating our purchases. Similarly with the extent to which actions are undertaken to avoid displeasure or disapprobation rather than to secure positive satisfactions; or the importance of new inventions ("It is said that the invention of the lady's bicycle materially affected the trade in low-priced pianos"[7]), or of the developing tastes of the individual. The modern advertiser would find most of the drives he strives to play upon recognized in Wicksteed's illustrations. He even has room in his system for men of such character that "the more money they get, the keener they are on getting more."[8]

For Wicksteed is primarily concerned with developing a system of universal economic principles. "A man's actual scale of preferences then may be full of inconsistencies and vacillations. But such as it is, it connects the various objects of his desire by a system of prices, and his successive acts of choice, whether purchases or other selections, are constantly revealing fragments of it, as he determines that at this price he will take this instead of that, and on these terms he will select this alternative and reject the other."[9] Life to Wicksteed consisted in choice-making within a framework

[6] *Ibid.*, pp. 28-30.
[7] *Ibid.*, pp. 23.
[8] *Ibid.*, p. 84.
[9] *Ibid.*, p. 34.

of relative and changing values, and this was what he was intent to demonstrate. That is why examples that many hold up today as showing how ridiculous the classical theory of consumer behavior is were to him only proof of its universality.

That is likewise, perhaps, why we today may be unappreciative of the beauties of his theory. We are concerned with different problems. For our purposes he has generalized his principle of consumer behavior to such a point of ubiquity that we find in it no handles to grasp for solving our problems. Wicksteed was concerned more with illustrating motivations than with devising techniques for measuring their relative strengths in determining specific consumer behavior. He places emphasis upon the great heterogeneity of influences affecting that behavior and the complexity of their interrelationships (as do many of our modern psychological critics) rather than on ways of selecting those influences that are crucial in particular situations.

As evidence that this is still a prolem, Richard Stone in his monumental new work on consumer demand is led to comment on "the contrast between the carefully elaborated theory of the influence on demand of income and prices in a static situation and the extreme vagueness about the way in which changes in tastes and habits affect consumers' behavior. Until more work has been done on the latter problems much of the theorizing about consumers' behavior must be regarded as badly out of balance from the point of view of applications."[10]

Concepts Used Today

What, then, are the problems of consumer behavior for whose solution we find available principles so inadequate? Among the general economists, apparently, most important is the problem of the "consumption function." At any rate, in the *Survey of Contemporary Economics* published under the auspices of the American Economic Association, the sole article on our subject, contained in Volume II, is directed explicitly to this problem. Actually, Ruth P. Mack, author of the article, permits herself to expand on the general subject of consumer behavior as developed in modern psychology, summarizing: "In short, in twentieth-century America, virtually everything that influences what a person is and how he got that way—a process of constant interaction between the evolving individual and his social field—influences what and when and how much he buys or saves, and indeed in part how much he makes. Currently, his buying is a function of what he is, what he has, the recent history of his purchases, what others have or buy, what he expects, what he hopes, the habits that he has estab-

[10] Richard Stone, *The Measurement of Consumers' Expenditures and Behaviour in the United Kingdom—1920-38*, Vol. I. Cambridge, England, and New York.

lished, and very nearly everything else. The dynamics of consumption is in our society co-extensive with the dynamics of personality."[11]

She reviews the state of our knowledge of factors determining consumer behavior under eight headings, and, like Stone, finds the results seriously unbalanced. The influence of income and price, separately and jointly, have been heavily worked over in numerous statistical analyses, yielding Engel's curves and multiple-regression demand curves and various estimates of income and price elasticities. These curves may serve for short- or intermediate-term forecasting, but they scarcely add up to principles of consumer behavior. Rather, the variability among the groups composing the aggregates only serves to emphasize the need for studying the influences underlying this variation. Among these she discusses our varying degrees of ignorance regarding the effects of income changes, standards of living, wealth, family size and composition, habits and expectations, and miscellaneous others. In general she finds that, while we know they are important, our study of them has served more to raise questions of just how they act and interact than to answer such questions in terms of principles of behavior.

Agricultural economists, also, are concerned with the "consumption function" as a factor in forecasting the general level of activity of the economy within which the outlook for agriculture must be formulated. But we are interested more specifically in the demands for particular agricultural commodities or commodity groups. A good deal of effort has gone into the statistical study of demands for farm products, and a good deal continuously goes into current appraisal of their market situation and outlook. Conceptually, we think of these as derived demands, reflecting the ultimate demands of consumers for food, clothing, and other goods. Practically, however, we recognize that demand at the farm level involves the behavior not only of consumers but of the many intermediary buyers and sellers engaged in transforming raw products at the farm into consumables in the retail store. Their behavior is only partly determined by that of consumers, or even by what they think consumer behavior will be. Hence the development of principles of consumer behavior has not generally been a matter of primary concern to our commodity analysts, and their forecasting equations have not generally included variables describing it except for some aggregate measure of consumer income. The relationship of the latter to levels of consumption and expenditure for foods and other farm products has been the subject of more intensive inquiry by Burk and others, with results included in the summary by Mack previously cited.

[11] Ruth P. Mack, "Economics of Consumption." *A Study of Contemporary Economics*, American Economic Assoc., Vol. II, pp. 42-43.

The outstanding recent comprehensive analysis of demand at the consumer level is, of course, Stone's newly published work, previously mentioned. Even he, however, includes only prices and income as explicit factors determining consumer behavior. In his theoretical discussion he describes some of the ingenious attempts that have been made to take account of other factors through introducing time-variables and through using dynamic factors reflecting previous levels of expenditure or different rates of response to changes upward and downward. He comments on the unsatisfactory nature of these devices: "The apparent importance of terms involving time in analyses of market demand indicates a serious situation, particularly from the point of view of prediction. First it suggests that the main long-term factors determining market demand are not income and prices at all, but are influences which it is hard to specify and still harder to measure. In such a situation prediction, except over a very short period, must be extremely unreliable, since the prediction depends largely on the extrapolation of a simple function of time and not on the response to clearly specified and measurable influences."[12] And again, "the need for (residual trends) indicates that the economic theory of consumers' behavior is an open theory which does not take into account important influences on consumption. . . ."[13] He points to "the need for more cooperation between economists and other social scientists."[14]

However, the derivation of the customary demand curves for price forecasting is not the only interest of agricultural economists in consumer behavior. The raising of levels and standards of consumption of food and other farm products has been of concern for many years, as has the use of devices for protecting farm prices through regulating the movement of supplies to market. More recently there has been a great expansion in programs for widening the markets for farm products through developing new products and through better adaptation of old ones to consumers' wants; through improving associated marketing services, like packaging; and through more effective merchandising or through advertising and other promotional efforts. Research investigations of consumers' preferences and of their responses to various sales efforts have been stepped up correspondingly.

Here are problems in which the forecasting of consumer behavior cannot be masked under a statistical time-variable. The answers need to be concrete and specific. Here, even more than in the demand studies, we have felt a lack of guiding principles.

But the very specificity of the questions has been a bar to undertaking

[12] *Op. cit.*, p. 271.
[13] *Ibid.*, p. 412.
[14] *Ibid.*, p. 272.

basic research that will develop principles. We have wanted to know what size and color of potatoes consumers prefer, or how they want their apples packaged, or how much more milk or orange juice they will buy from mechanical dispensers, or what the potential market is for a new frozen juice concentrate. Such questions require specific studies. But the answers usually apply rigorously for this day and train only. Principles are needed to give us better guidance as to how far the results may be generalized—or, even more, as to what factors must be included to give us generalizable results at all.

If we are to make progress, we need to do more investigating what determines the preference patterns of consumers, and what causes them to change from one situation to another. It will take a long time, at best, to accumulate empirical data and build from it a set of principles adequate to our purpose. If we continue to restrict ourselves merely to finding out what the preference pattern or buying behavior is of this group of consumers today, we may never get to principles at all.

Our problem immediately leads us, of course, into psychology. Unfortunately, the psychologists have been rather more prompt to point out the ineptness, from a psychological standpoint, of classical utility theory of behavior, than to give us guiding principles to follow.[15] Divergent schools of psychology lead us in different directions.[16] The most concrete effort that has come to my attention to develop quantitative techniques for measuring motivational factors in buying behavior involves application of the vector psychology of Kurt Lewin. This work, however, I would judge from reports so far,[17] is still in an exploratory stage, far from anything that marketing researchers can apply in getting at answers to specific questions like those cited above.

Developing Specific Tools

Progress has been made towards relieving methodological confusion regarding such things as the types of studies appropriate to different problems; matters of questionnaire development and experimental design, sampling, etc.; and the drawing of valid inferences from the data collected.

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[15] But for a report of some work in this direction, as well as a summary of the criticisms, see George Katona, *Psychological Analysis of Economic Behavior*. McGraw-Hill, 1951.

[16] For a summary on this subject see: Wroe Alderson, "Psychology of Marketing and Economics." *Journal of Marketing*. Vol. 17, No. 2 (October, 1952), p. 119.

[17] See Warren J. Bilkey, "The Vector Hypothesis of Consumer Behavior." *Journal of Marketing*, Vol. 16, No. 2 (October, 1951), p. 137; and Joseph Clawson, "Lewin's Vector Psychology and the Analysis of Motives in Marketing," in R. Cox and W. Alderson, eds., *Theory in Marketing*, Chicago, 1950. Also discussion in preceding citation.

On these issues we are by no means yet out of the woods, but a good deal of light has been breaking through.[18]

As agricultural economists we have long been familiar with survey techniques, though even here we have had new things to learn on framing questions that will give meaningful information regarding consumer attitudes and preferences. There still is some evidence of rushing in naively, without the benefit of sound expert advice, with consequent disappointment in results.

Meanwhile, the testing of specific merchandising or promotional programs led us logically into attempting controlled experiments, a method of research that most of us have had to learn from scratch, adapting methods from other fields and improvising as we went. Here, too, a good bit of unsophisticated enthusiasm has been displayed, with later regrets.

But the development of methodology for surveys and experiments to study consumer behavior is not the development of principles of behavior itself. Methodology is concerned with how to obtain specific information; principles give us understanding of what information it is significant to go after.

What We Have Learned

All this is not to say that our studies have contributed nothing to the understanding of consumer behavior. We are now generally aware, as Ruth Mack clearly expressed, of what Wicksteed knew in 1910–that human beings are very complicated organisms, whose behavior in the market place, as elsewhere, is subject to a great many influences, and who have a peculiar ability for internally combining and adding to external stimuli, often with startling results.

We are sometimes disheartened by the variability of consumers' preferences and market responses. I wonder if we are not too prone to focus on average or modal behavior, and ignore the market opportunities that the dispersions in our data might offer.

We are aware, likewise, that consumers' responses have thresholds–another fact that Wicksteed pointed out–so that stimuli may evoke no response up to a point and may then suddenly bring striking responses. A corollary to this is the usefulness of calling attention to the stimuli–through advertising, for example–or of making the stimuli strong enough to call attention to themselves–as through substantial rather than marginal price changes.

[18] See, for example, "Market Demand and Product Quality, A Report of the Marketing Research Workshop," USDA, 1951 (processed). The subject will be further explored in the 1954 Workshop.

Similarly, we are aware that consumers' actions may not be independently additive, subject to the cancelling out of random variations in the course of aggregation, but that they may interact through the phenomena of group behavior. When groups of consumers simultaneously—or mutually—reach response thresholds, the ensuing reactions can be cataclysmic in magnitude.

I hope we are also ready to give up arguing over whether consumers are rational or irrational, or where they fall on the scale between. We do not require of cows or grasshoppers or experimental mice and rats that they give reasoned responses to our ministrations for us to be able to study their behavior. I have never understood why we should require this of humans. Rather, the very assumption of deliberative choice implies a possibility of spontaneous variability in response that would seem to make prediction of behavior more, rather than less, difficult—unless, as often seems true, we mean by "rational," "responding in the manner in which I, by hindsight, judge that one ought to have responded in such a situation." It is time to pay the consuming individual the respect due a person capable of his own rationale and competent within it.

I hope, accordingly, that we may also be developing some respect for the level of intelligence displayed by consumers. Our studies, I believe, find more method in their madness than often appears on first observation, and an ability to give sound reasons for their preferences and choices. That they do not always respond as we would like them to need be no reflection upon them. Actually, the wonder is that consumers retain any spontaneity of action and decision at all, buffeted about as they are in a world of tie-in sales and promotional pressures. Their ability not to be misled is remarkable, as is their ability to learn quickly not to be imposed upon a second time.

Corollaries of this are first, that we must be on guard in our sales tests, against judging by initial reactions. Carry-over effects are important, and, especially with agricultural commodities, repetitive behavior is usually our goal.

Second, we will do better in the long-run to devote ourselves to adapting to the consumers' motivations rather than trying merely to mold them to our own wishes. Alderson remarks, "The marketer should avoid the false distinction of thinking of himself as a problem-solver but regarding his customers as elements subject to manipulation.[19] Consumers want convenience; let us furnish it. Time is for them a scarce commodity; let us help them save it. If in prosperity they seem unresponsive to small pecuni-

[19] *Op. cit.*, p. 130.

ary incentives, let us adapt our mechandising practices accordingly, ever mindful that this is not a uniform behavior pattern for all consumers and that under changing economic conditions it can cease to be the dominant pattern.

These are a few of the rough guides or rules of thumb that perhaps emerge from our increasing knowledge of consumer behavior. Many others could be suggested. They are more in the nature of suggestions of things to watch out for than the beginnings of a set of principles.

Conclusion

How then, in conclusion, does our theory of consumer behavior stand after 40 years? Conceptually, we still think of the consumer demand function as a multi-dimensional surface, the composite of many such functions characteristic of individual consumers. Our problems consist ideally of taking sections through this surface along different combinations of dimensions whose variation is relevant to the different types of questions we study. Actually, we are extremely ignorant regarding this surface, though increasingly aware of its intense complexity. Our efforts in practice are confined to sketching out crude approximations to those pieces of it that seem most pertinent to our particular inquiries, whether price forecasts or the testing of merchandising programs.

This exposes us continuously to dangers of over-simplification and unwarranted extrapolations. For conceptually, at any rate, we are guilty of gross errors of aggregating items not simply additive, of using linear approximations of phenomena that we know are capable of sharp curvature approaching outright discontinuity, of treating sub-systems as self-contained within a universe in which presumably all parts actually are inter-related.

We may justifiably take some pride at the degree of success we have enjoyed in working around these pitfalls and arriving at useful answers to questions. But our pride must be sobered by the thought that, in the very nature of the case, the dangers are greatest at the most critical times. Precisely the extraordinary deviations, that are most important to foresee, are the ones where the influences that we do not know but can only guess are the important determinants. Just when we most need guidance we are left to play by ear.

Hence the importance of putting greater emphasis upon the search for basic principles, drawing upon psychologists, sociologists, and the trade practitioners, too, for such insights as they can contribute towards a better understanding of the complex nature of consumer behavior.

DISCUSSION

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I found this paper very stimulating and view the topic as one of great importance. If I seem to sound otherwise it is because it is difficult, as many of our Pennsylvania friends might say, "to lay my tongue to it" in any other way.

The paper points out the negative attitude taken by psychologists toward classical utility theory of behavior. That the attitude is negative is, of course, quite understandable. It is probably true in any discipline that it is much easier to point out the ineptness of principles than it is to develop principles. I feel that economists, especially agricultural economists, are at least as much to blame in this as are the psychologists. Very few of our research projects in consumer behavior would show cooperation with trained psychologists. Some of the reasons for this are fiscal and administrative. Pressures from industry are for the solutions to specific problems of importance to immediate operations. Agricultural economists could help this situation by asking for the aid of psychologists, to the extent of financial support, in research in this field. The USDA is doing better on this than the experiment stations. The other way economists could help would be in advising students in agricultural economics to take some work in psychology.

In regard to studying the rationale of consumers Southworth states "I have never understood why we should require this (reasoned responses) of humans." Whether the reasoning process should be considered depends on its being a factor in predicting behavior. Many studies have actually covered up the pattern of aggregate human behavior through segregating the consumer aggregate into groups that "ought" to reason in certain ways. Often these results lose their value for predicting aggregate behavior and merely become raw material for dialectics. To this extent I agree with Southworth. It is suspected, however, that the reasoning processes of humans might be more variable and less basic than those of other animals. For example, mice and rats probably have not changed their attitudes toward, and consequently their behavior in regard to, cigarettes because of any reports in cancer research. Even in a case of this kind it would be useless to study the effect of the reasoning process if behavior could be adequately determined without it. The only reason for studying it would be to gain a tool to use in some other instance and the probability for the existence of analogous conditions in the future should be an early part of the analysis.

I do not agree that we should "be developing some respect for the level of intelligence displayed by consumers." Rather, I feel we must adopt an attitude of objective indifference to this. We should learn to disregard consumer motivations except insofar as these become significant factors in prediction.

We are learning to conduct experimental sales tests. The method is, however, being abused both in its adaptations and capabilities. In West Virginia studies, one of which was a technique study in cooperation with the Bureau of Agriculture Economics, we have learned that in certain simple visual differences consumer opinions are both more reliable and efficient than results of controlled experiments in established retail stores. Results have been correlated from the two methods. In our controlled store experiments customers have not been as

responsive to price variables as opinion surveys indicate they would be. Undoubtedly this has been because customers have faith in the retailer's pricing. Only if we can put the customer on a buyer-beware basis can we isolate our introduced factors from this faith in the retailer. Introduced economic variables can not be isolated and controlled as well as physical variables.

Carryover effects are important but these do not worry me nearly as much as first-reaction analysis. Usually the carryover tend to lessen the difference and silence or at least dampen the undiscerning experimenter, but data from first reactions may give extremely significant statistical differences wrongly interpreted to have ubiquitous and long-term application whereas they would become quite different in experiments designed for projection.

I agree that the intermediaries in the marketing channels do not reflect consumer desires in any degree of accuracy needed for basic research. The "business as usual" thus can not be observed as a basis for learning fundamental principles in consumer behavior—at least not with any technique known to me.

I would like to add my voice to help point out the danger of "treating subsystems as self-contained within a universe in which presumably all parts actually are inter-related." It is like the numerous gas-saving carburetor devices that additively soon save more than 100 percent of the gas. The results of one of our experiments in pricing and product differentiation showed rather conclusively that $6000 more could be netted on eggs by adopting the recommendations of the study—at least in the store in which this particular work was done. When I was reasonably sure I had convinced the management of this fact, I was told—much to my chagrin—that the increased egg sales had been at the expense of cheese sales, upon which the store was making a higher margin. Our tools for studying cross-elasticities of demand and for relating these to cost factors need to be used more carefully and developed to the point where it does not take an intuitive genius to use them.

In addition to "developing some respect for the level of intelligence displayed by consumers" Southworth could well have pleaded for more respect for the intelligence *not* displayed by the researcher in consumer behavior. I do not believe that the current reports in the field of consumer behavior properly reflect either the level of intelligence of the researchers or the progress in developing guiding principals. The reports are usually confined to answers to specific questions important to immediate operations. Too often the reports are mainly prosaic classifications of consumer segments who ate or bought so much so often, and the like. The researcher who, in his own mind, settles for this as his end goal must have a boring job indeed. I doubt if many settle for this goal. Wicksteed, Southworth and I seem agreed that there is a "need for more cooperation between economists and other social scientists." It seems to me that there is also a need for cooperation among economists themselves to help bring about conditions that will encourage the researcher in this field to release such "by-product" results that could be considered as contributing to a system of principles. Even if such results seem very fragmentary, or even at times not very logical, they should receive sympathetic treatment by our own profession.

MARKETING EXTENSION

Chairman: A. G. Waller, Rutgers University

INTEGRATION OF PROGRAMS—A CHALLENGE TO MARKETING RESEARCH AND EXTENSION

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DURING the last decade as agricultural marketing research and extension has developed and expanded so has it matured in terms of improved methods and greater contributions to a more efficient economic system. Research techniques that enable marketing economists to provide reliable guides to the solution of operational problems of marketing firms have been developed and there has been an increased volume of such research. This has been accompanied by an increase in marketing extension. This recent growth has emphasized the question, "How can we accomplish greater integration of marketing research and extension to more fully realize the potential benefits of marketing research?" Many marketing economists believe that attention must be directed more acutely in the future toward application of these research results by marketing firms if resources devoted to research are to produce their potential benefits to society.

In a sense all marketing specialists integrate marketing research results into their research and teaching. Each research report read and filed and each research or teaching experience becomes a part of our fund of knowledge called forth for application to problem situations encountered. Such integration is essential to both research and extension programs. It is an essential part of a specialist's continued growth and education whether he devotes his energies primarily to marketing research or extension. The problems of marketing firms with which marketing economists can be of assistance frequently are complex, broader in scope than an individual research project, requiring for their solution information from several disciplines. Marketing economists can use results of many research projects in several fields as they help management analyze their problems and achieve greater efficiency. It is a challenge for each of us to strive constantly to improve his ability to achieve this sort of integration. While it is important to consider means that we can use to do this, the author is turning his attention to another phase of the subject.

Integration of marketing research and extension means more than study of research reports by extension personnel, more than cooperation among extension and research workers or coordination of separate research and extension programs. Integration of research and extension implies a

combination of the several problem solving functions to provide a unity, an uninterrupted sequence from problem recognition and identification, through hypothesis formulation and testing, application of results to operational problems and a resolving of the problem situation. In this paper the author's attention is directed toward means of obtaining this sort of integration by marketing economists working with marketing firms. This discussion is from the point of view of a marketing economist with experience in extension and research.

Marketing Research And Extension Have Similar Objectives

The objective of marketing research as stated by a number of leading economists, seems fairly clearly defined with little disagreement, at least in terms of broad goals. The primary concern in marketing research is efficiency in providing a series of services in moving goods from producers to consumers in the time, place and form they demand. This improved efficiency also is the objective of marketing extension. Marketing specialists in research and extension, relying on economic theory, marketing research and their general knowledge of the industry, seek to provide a basis for management to make efficiency-improving changes. Both extension and research marketing specialists devote a high proportion of their time to problem-solving with similar objectives, attacking similar problems with the same arsenal of weapons.

Increased Efficiency Requires Change

This improved efficiency might be accomplished by reducing the cost of one or more services now performed, increasing the cost of one service with more than compensating reductions in cost of other services, the elimination of services, or the addition of services that consumers want and are willing to pay for. For this objective to be reached it seems obvious that firms performing marketing services must make changes in the services performed or the combination of resources used in performing these services. Marketing economists therefore seek to bring about these more efficient combinations of resources through research and extension by helping the management of marketing firms analyze their problems and supplying economic information valuable in making managerial decisions.

The changes indicated may or may not be a considerable departure from normal, the research results may apply to a small number of firms, on a national, regional, state, or only local scale. The results apply to each firm's operations somewhat differently and indefinitely. The results of each research project may apply to the operations of different firms.

But for the research results to produce their full value for society they must be presented to and used by the management of the firms where they

do apply, the research and application or extension should be parts of one continuous problem solving process. We must consider what organization and procedure will best make this a continuous process when working with marketing firms and in a setting where both research and extension funds are available.

Observations On The Application Of Marketing Research Results

Recognizing that it is difficult to generalize about marketing extension permit me to make these observations on the application of such marketing research results—observations from experience in marketing research and extension.

In some firms and industries there is a strong reluctance to change, while other firms actively seek opportunities. The incentive to change may be greatest among the firms of expanding industries and industries generally depressed. In some industries where a rather stable competitive balance is established among a small number of firms there seems to be an incentive to resist change.[1]

Research results valuable in making decisions affecting investment, use of plant and equipment, training of employees, pricing and merchandising policy, purchasing policy, etc., must be presented effectively to the level of management responsible for these decisions. In smaller firms this probably is the owner or manager and in all firms executives of considerable responsibility, authority and stature.

These men generally are successful business men with years of experience in the firm—men of accomplishment and justly proud of their record. They have made business decisions on the basis of their observations and analysis and often with inadequate assistance from research. Those without previous experience with research results may not appreciate opportunities to improve their decisions by using the results of marketing research. Their confidence in marketing research is encouraged when it is presented by a specialist with stature in his profession, and a thorough knowledge of the subject under discussion. These people as well as executives in marketing firms who are accustomed to the use of marketing research want the results first-hand from someone thoroughly familiar with the research methods, the details of analysis and limitations of the results. Once marketing agencies have successfully modified their operations on the basis of research results they give it greater respect, frequently seeking assistance from marketing economists.

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[1] For a comprehensive discussion of the failure of some marketing firms to seek greater efficiency and to apply resaerch results offering improved efficiency see Harry C. Trelogan, "Barriers to Market Improvement." *Report of the National Marketing Workshop on Market Organization and Facilities, August 7-15, 1953.*

Within any state the number of marketing firms that can actively use the results of any one marketing research project in their operations is small compared to the number of farmers who can use production research (except independent retail grocers and some other large groups).

In many cases it is not necessary for the marketing specialist to present his results directly to all the firms that can use it. Marketing firms frequently are keenly aware of each move made by their competitors. In these cases a change, once made by a leader, will spread rapidly. The changes indicated by research also offer benefits to other industries—manufacturers of packages, equipment and others—these firms, seeking their own profits, will use research results to improve their position and further distribute the information.

In many cases the application of research results in marketing requires more than research or extension publications and mass media giving the highlights of results. Among marketing firms as among farmers there is no means more effective than demonstrations conducted by the marketing specialists in operating firms by introducing the recommended changes under conditions that permit observation and measuring of the effects. Such demonstrations are most effective when the demonstrating firm is in a position of leadership. If conducted by a suitable design, demonstrations can also contribute to a refinement of the research results by providing information about the manner in which the results apply under varying sets of circumstances and by identifying relationships between the changes made and other operating problems.

Extension organization for education in production problems has been built on an accumulation of research results built over several decades—much of which is little affected by the passage of time. Marketing research has not had the time or resources to produce such a base and many of its results soon become obsolete.

It seems appropriate also to observe that marketing specialists develop a reputation among their colleagues and among the marketing firms more because of their research findings than because of their efforts, often subtle and unobserved, directed toward encouraging management to use these results in the decision making process. Professional economists with thorough training in the theory and practice of marketing are responsible, free thinking people willing and capable to select the problems on which they work, with the consultation of colleagues and the trade. None are mere peddlers of information. Some variability can be expected in their analysis of the problem situations depending on the individual training and experience. Such people are not satisfied to be chained to a system that denies them the opportunities to develop and test hypothesis or to work with the trade on the application of their research results.

Applying These Observations

These general observations, to which there are of course numerous exceptions, serve to emphasize several points of similarity and contrast between research and extension with marketing firms on the one hand and production firms on the other. The contrasts and similarities deserve close attention as we seek ways to improve marketing research and extension. Organization and procedures for marketing research and extension must certainly recognize the characteristics of the marketing problems, marketing industries, firms, and managerial personnel. This marketing specialist and many associates conclude that the most efficient use of marketing personnel and funds is obtained when each marketing economist in the land grant colleges conducts problem-solving work through all its phases—research economists conducting some extension and extension economists conducting some research.

While this is not an uncommon arrangement for marketing economists it is in conflict with a frequently expressed clearly defined line between the realm of the marketing extension specialist and the marketing research specialist. Within this frequently expressed concept it is considered the job of the marketing research worker to test hypotheses and publish the results, while the extension specialist helps identify problems for the researcher, conducts education to get the research results used in solution of problems, and conducts general economic education among the personnel of marketing agencies. Such a division of responsibility certainly has strong advantages—enabling the research specialist to use fully his talents for conducting research, and the teacher his talents as a teacher.

On the other hand that division of labor may not be so well suited to marketing as to some other academic fields. Such organization does not help avoid and may contribute to important difficulties—research offering little to the general understanding of marketing problems or their solution, the use of research methods poorly suited to the problem situation, and dust collecting on excellent research reports that are unknown and unused by marketing firms. It can contribute to the development of extension programs conceived without reference to available research results, and planned and executed with only a flimsy basis in sound economic research and analysis. With this division of labor research and extension specialists may each go his way. The researcher may be dissatisfied with the use of his product and extension specialist may have inadequate research for the problems on which he is working. It may also lead to the selection of extension personnel who are inadequately trained in the principles of economics, overemphasis on teaching methods and educational effort with goals only remotely related to improved marketing efficiency.

The organization of marketing research and extension suggested here

has many advantages. It recognizes that an effective teacher must be an expert on his subject and must have enthusiasm for it, encourages research on problems important to marketing firms, enables researchers to observe the limitations of their methods and results, and encourages extension projects backed by research.

Within such a framework, extension marketing specialists maintain responsibility for training county agents and general marketing education with marketing firms while other marketing specialists may be responsible for development of research methods, and resident teaching—yet both conduct research and extension to improve the efficiency of marketing firms.

Also within this framework the extension specialist can be available to take responsibility for certain phases of the extension job when the results of a given research project conducted by a research specialist apply to large numbers of firms or when for other reasons extension is beyond the scope of the researcher's resources. Likewise the extension specialist may cooperate with or turn over to the research specialist research that is beyond the scope of his resources. An extension specialist who is up to date on research methods and a researcher with extension experience are well prepared to work together.

An Illustration Of Integrated Research And Extension

Such an integration of marketing research and extension requires an administrative climate permitting, encouraging, in fact holding us responsible for it. It is recognized that administratively there are advantages to a clearly defined distinction between research and extension activities. From the point of view of the marketing economist the division of responsibilities must be one that assists us in working with marketing firms toward a solution of their problems. Each marketing economist is now faced with the challenge of contributing to a greater integration of research and extension with existing personnel and within the framework of existing administration and organization. Each situation is different and each person must use somewhat different means.

A brief summary of a case history in which some integration was obtained by research and extension specialists may serve as an illustration. This is not presented as a perfect example of teamwork and integration but rather as a case illustrating some of the principles and problems—a case that the speaker knows from personal experience.

Leading apple growers and their organization, influenced by falling consumption of apples, low prices for several seasons and rising production costs, developed a strong interest in improving the marketing of their product. The work of extension specialists helped to focus attention

on the product as offered in retail stores, its quality and merchandising practices used. Research and extension specialists in marketing discussed the problem with growers individually and through their organization. A marketing economist decided on a program of research after becoming personally acquainted with the situation, analyzing the problems, deciding that there were good possibilities for accomplishing beneficial results, and obtaining full cooperation of the producers' organization. The extension marketing specialists contributed to the research plans by obtaining information indicating variations in apple quality and handling and merchandising practices.

Greater integration of effort occurred after the researchers obtained positive results in the fall of 1950—results indicating possibilities for increased apple sales if retailers would adopt certain merchandising practices. These results were first reported to growers during January, 1951 before the analysis of research data was complete. The researcher's report, presented in a most enthusiastic and effective manner, encouraged a few growers to persuade the retailers they served to use these merchandising practices the next fall. Some accepted the results with scepticism pointing out that the research was conducted in a limited number of stores in only four cities and over a short period of time.

The extension marketing specialist, recognizing the research results as offering opportunities for improving the efficiency of apple marketing, undertook a program to secure use of these results by the retail trade. A stuffer summarizing the research results on one small sheet was prepared and 100,000 copies were placed in apple boxes by producers. Articles were prepared for farm and retail trade publications. Special attention was given to chain stores. A demonstration was conducted in the stores of a leading chain over a 12 week period. The object was to observe problems involved in the use of these merchandising practices, to determine whether lasting results could be expected, and to show management of a firm exerting leadership that their operations could be improved on the basis of the research. The chain quickly modified its practices, and other stores followed suit—influenced by the producers who also were encouraging them to change. At the same time research continued, as experiments were conducted in other cities and other chains to answer questions left unanswered the first year.

The extension specialist prepared and distributed a folder presenting the research results to store management, distributed the research results to package and equipment manufactures, conferred personally with management of most chain companies with stores in the State, discussed the research with county meetings of growers and local groups of retailers, prepared articles for radio, the popular press and publications of the re-

tail trade, and discussed the work with specialists in other states. He also prepared a set of colored slides and notes for a talk on apple merchandising that was distributed to chain companies and extension workers. In the fall of 1952, when apple prices were higher than during the previous two seasons, the research and extension specialists pooled their resources to recheck the results under the new price conditions. Also that year, when retailers in a large city were slow to adopt the new practices, the extension specialist conducted a demonstration in chain stores there. The results of this indicated the need for further research in large cities and contributed to the development of a cooperative research project in Pittsburgh in the fall of 1953. As the research and demonstrations have been conducted the specialists have cooperated in weekly releases of the latest information, helping to distribute results "fresh off the griddle" and maintain interest in improved apple marketing.

The marketing research specialist too was active in extension of the research results, discussing the work with producer and retailer groups on a national level and in states from coast to coast. Assistance and advice was provided by both specialists to growers and retailers and both worked closely with the producer organizations encouraging them to help obtain improved merchandising.[2]

This combination of efforts in an integrated program contributed importantly to a widespread application of the research results and benefits to producers, retailers, and consumers. The extension specialists became familiar with and enthusiastic about the research results by assuming responsibility for certain phases as a part of demonstrations. All those associated with the work derived considerable satisfaction from tangible accomplishment.

This integration of effort, fostered by an administration that gives considerable individual feedom yet encourages close working relationships, was possible because of individuals with a common recognition of the importance of an industry problem and a mutual respect and confidence between workers, evidenced by a willingness of the researcher to entrust the extension specialist with a part of his treasure and the willingness of the extension specialist to share in the researcher's burden.

Certainly there are numerous cases in which extension specialists in marketing and marketing research specialists cooperated in integrated programs of research and extension on specific marketing problems. Each

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[2] The building of this type of relationship among research and extension marketing specialists is not unlike the task of integrating the activities of economic specialists working in other fields. Much of the discussion of "Integrating Extension and Research in Farm Management" by Richard G. Ford in *This Journal*, December, 1952, p. 882, applies to marketing.

case would illustrate somewhat different conditions and different means of working together.

There are many related questions that also present challenges as we consider the integration of marketing research and extension. How can the services of county agents be effectively used in an integrated program of marketing research and extension, especially when the marketing agencies cross county lines and when they are not in a county where production of the commodities handled is an important enterprise? How can the application of research conducted on a regional or national basis be facilitated? How can greater use of research results be obtained by firms outside the state where the research is conducted? How can demonstrations be effectively conducted with marketing firms? These questions and others also deserve the close attention of marketing economists.

DISCUSSION

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Professor Lloyd H. Davis, in introducing *marketing integration* combined professional sophistication with conspicuous seriousness of purpose, sincerity of presentation and a marked degree of humbleness. This in turn commanded above average alertness and provoked serious thought among the audience.

His central interest was to probe and counsel with us on a very difficult subject, rather than to follow the pattern a small minority of public servants sometime use of paternalistically revealing, as if those of us in the audience were wayward stepchildren, their self-appointed inner secrets of successful integration of programs in marketing research and extension.

No individual, no group and no agency has a monopoly on knowledge regarding research and extension integration in marketing. Thus reliance upon as many interested minds as possible is the most appropriate and direct route to arrive at valid decisions.

Basic Considerations Pointed Out

There are at least six important considerations involved in securing optimum integration. These follow with varying degrees of elaboration on my part.

1. *The approach to better integration must be joint, continuous and expedited through basic problem areas.*

This calls for clearer understanding and even better appreciation than in the past of the personal traits and phobias of the individuals concerned and of the requirements for the progress in their respective positions.

To do this takes more than self-imposed cooperation among individuals at any given level in the hierarchy. The head of the department must always be on the lookout for ways and means to encourage closer cooperation. More productive office arrangements, more adequate travel funds, as well as equal access to reference books and journals, are starters.

2. *Both research and extension personnel must respect the value of economic principles and their special setting in agriculture.*

There have been times when either an extension or research worker took it upon himself to decide for the constituency whether a marketing margin was too large. After making this decision he soon decided also that it had come about largely through the greedy, grasping hand of some un-needed middleman.

The alternative, and a far better service to farmers, in my opinion, is for both the research and extension specialists to point out that margins are determined largely by the supply and demand for the product at hand plus the supply and demand of various marketing services in the competing area. The question of fairness is explained in part as a value judgment and in part by the right of entry to most businesses and the range of free choices provided both buyer and sellers in our economic system.

One marketing specialist I know looks upon *theory of the firm* only as an addition to his popular vocabulary, if that. In part, this reasoning stems from the fact that a good many technical specialists trained largely in production have learned the relatively simple intricacies of figuring the cost of or saving on a particular marketing process, thereby qualifying as a full-fledged marketing specialist.

One further caution. In the absence of proper appreciation of principles, specialists in both extension and research can be just peddlers of information, providing information that is not packaged to provide the basis for future action. Surely this is not the hand of science.

3. *Proper integration calls for work simultaneously with farmers through the county agents and with the trade.*

Specialists assistance to business may or may not go through the county agents and those in charge of research field stations but it should always support them. This idea of specialists working directly with business firms is not new. It has been the practice for years in production education. Just check the past contacts with banks, insecticide companies, retail store management, large food processors and oil companies.

4. *The marketing job may call for more joint assignments of personnel in both extension and research than was necessary in production.*

Old timers in both services used to speak of man as "being not the extension type" or "not the kind who can do effective research." They were right in the old days. There appears little place for such statements today. Equal professional requirements and a much better educated farm population have greatly narrowed the personal characteristics for men in the two fields.

5. *Fundamentally, the budget approach offers as much to marketing extension and research as to farm management.*

In lieu of this approach—time consuming and complicated as it may be in marketing—I am afraid we will turn to the enterprise and practice approach, time honored in the technical production field, but also with the attendant shortcomings so obvious today. This is not to say that the enterprise approach does not have an important role in marketing as in production. It does.

6. *Marketing integration carries with it a heavy responsibility in public relations.*

The marketing specialists have many "publics"—both in and out of the Land-Grant Colleges. Within are the technical specialists, fellow social scientists, district and county agents, women specialists, and administrators. I would

include USDA personnel as insiders. Outside, are the farmers, middlemen, auxiliary services, etc. They are all in the marketing game. You have the choice, therefore, of working together in perfecting good plays and then alternating in carrying the ball, or you can try to carry the ball alone. In this latter instance, the blocking may leave something to be desired.

Shortcomings Apparent

Most of the shortcomings apparent in Davis' paper arose because of limitations upon his time. Time limitations required setting a priority on topics and confined elaboration to the space of a few minutes.

There were, however, two considerations that I would like to bring to your attention.

The *first* instance refers to the extent he wove the county agent into his presentation. During the latter part of his talk, he finally strolled up to the subject by asking a question and then graciously withdrew without firing a shot. I shall do likewise, with this exception. We should all remind ourselves again and again that *how well the county agent is fitted into the program and how well he performs his services in it is a mighty important consideration in the degree of success we will obtain.* My suggestion is to go through the county agent whenever possible but regardless, always keep him well informed of what you do.

The second shortcoming had to do with the marketing demonstration on apples. Actually, I wasn't sure how it came out. Who benefited—the farmers, middlemen or consumers? Further, was the result a substitution of one food for another or was there a shift in demand?

Marketing research and extension challenges the best in us as individuals and as agricultural economists. With the proper respect for our colleagues in the technical sciences, for the administrators and for our associates in farm management, agricultural policy and the like, I am confident we can move forward steadily in this field.

THE PLACE OF CONSUMER AND RETAILER EDUCATION IN MARKETING FARM PRODUCTS

GALE UELAND
Federal Extension Service

CHOICE-MAKING opportunities are basic in our economy. In marketing agricultural products, the choices made by producers, handlers, and consumers are interdependent and determine the efficiency of the entire marketing system. Intelligent decisions must be based on knowledge of alternate choices available and the ability to weigh the relative values. It is to this end that educational programs in agricultural marketing are being developed. Programs must be in the public interest, but must also meet the problems and needs of each individual group involved.

In working on agricultural marketing problems, it is not enough that we work only with producers or to be concerned only with on-the-farm problems. True D. Morse, Under Secretary of Agriculture said, "Agriculture must be dealt with as a total industry—taking in all those who produce, process, store, finance, sell, and otherwise work with farmers and farmers' products. The narrow view is to consider only the 16 percent of the population now living on farms. Such a limited approach will restrict agricultural progress."

A relatively small part of marketing costs involve on-the-farm services. Since more than half of the consumer's food dollar goes for marketing, and since the retailing function constitutes the major part of the cost of marketing, off-the-farm activities must be regarded as highly important.

The familiar concept of marketing includes all the various services involved in moving products from the farm into consumption in the form and at the time and place desired by consumers, and at a price which the consumer is willing to pay. I'd like to take it a step further and say that from the long-run interest of an industry, the marketing job is not complete until we have customers who are well informed and satisfied with the products offered them. Adam Smith, in his time said, "Consumption is the aim and end of production, and it pays the farmer as well as the nation as a whole to start with what the customers want and try to give it to them." Just having satisfied consumers, however, is not enough. In the book, "Does Distribution Cost Too Much," Stewart and Dewhurst point out, "Under our present economic system the main directing source of all economic activity is expenditure by consumers. To the extent that their choices are irrational and uninformed, the system fails to reach its optimum performance."

The principle of maximizing use of resources applies to consumption as well as to production. The educational work in marketing is directed

toward bringing about more efficient use of resources. It is important in this connection that means be provided for lines of better communication and greater understanding between producers, handlers, and consumers. To help do this, we in our educational work have certain people who work primarily with consumers, others who concentrate on on-the-farm marketing problems, and some who deal mostly with handlers and others who work with all these groups. One of the major jobs in developing educational work in marketing is to get a coordinated program. I have been asked to deal specifically with the part that consumer and retailer education play in marketing farm products.

Marketing Information for Consumers

To more clearly describe the educational work being carried on with consumers, we prefer to call them marketing information programs. So far the marketing information work with consumers has been largely in the food field. There are several reasons for this. In the first place, some of our more serious marketing problems are in that area; approximately 85 percent of the farmer's income is derived from the production of commodities used for food; in starting work it seemed advisable to limit the scope of the work until methods and techniques were developed to effectively reach consumers; food also represents one of the major purchasing problems of consumers both in terms of cost and health. The objectives of the work are to help consumers get more food and food value for the money spent on food, to adopt shopping practices which make for more efficient marketing, to have a better understanding of the marketing process, and to improve their ability to make choices.

One of the objectives of marketing information programs for consumers is to place emphasis on commodities in abundant supply, resulting in heaviest consumption when products are in season. Recognizing that the total demand for food is inelastic, such programs may contribute to consumers, growers, and handlers by shifting consumption to foods in heaviest supply. To the extent that these programs help to adapt demand to change in supply, thereby reducing price fluctuations they contribute toward fulfilling an obligation of a publicly supported agricultural program.

Educational Needs of Consumers

Many changes have taken place over the years that make the marketing job more complex. They increase the need for educational work. Years ago, when producers performed a great share of the marketing job themselves and had direct contact with their customers, they were able to determine very quickly changes in consumer preferences. Now this is no

longer true. As production has become more specialized and our population more urbanized, there is a lack of communication between producers and consumers. We now have one farmer producing the food supply for seventeen. Close to one-half of our consumers are at least one generation removed from first-hand knowledge of farming. About 85 percent of the total population is classed as nonfarm. About 30 percent of the people live in the five largest metropolitan areas.

Consumers now know little about seasonal variations in supply and price. An informal survey conducted in seven Oregon cities this past year on meat showed that more than half of the women surveyed were oblivious of the fact that there was any seasonal variation in the supply of different kinds and grades of meat. This survey was conducted to determine what shopping practices were being followed and what information urban consumers had regarding meat only. My experience, from working on a marketing information project for consumers in New York City, however, showed that the same is true for all food products. Consumers also lack information on what is involved in producing and marketing food, how to judge quality, and how to properly care for and use various commodities after they are purchased. Meat again offers an excellent example. Many of the less tender cuts are by-passed by consumers due to lack of understanding of the relative merits of these cuts and information on how to properly prepare them.

Another area where there is a lack of information and understanding, not only on the part of consumers but also by producers, is the spread between farm and retail price.

This lack of understanding and exchange of information between various groups involved in our marketing system represents a serious deterrent to efficient marketing. A well-planned and executed marketing information program for consumers should help provide for a free flow of information among producers, handlers, and consumers, and between these several groups. Today we rely almost altogether on price to perform the function of indicating consumers preferences. While price is effective if allowed to function freely, it alone is not enough. Price doesn't tell us if the change is temporary or a part of a trend in preference, or if a trend, why. The time lag between change in consumer preference and production adjustments needs to be reduced.

Food shoppers today are faced with a myriad of choices—there are from 4 to 5 thousand items in many of today's grocery stores. You can get many items either in fresh, frozen, canned, or dried form. The container size constitutes another variable. There is also a variety of different qualities of the same product offered, and the judgment of quality is not always easy. Unless the consumer can identify quality and is willing to pay for it,

it would be futile to work with producers and marketing agencies on quality improvement. Added profit is the motivating factor behind most of our advancements in production and marketing. New products, new forms of old products, new packaging methods, and new merchandising techniques are constantly being offered today's food shopper. These factors all contribute toward making the consumer's decisions more complicated.

Even with all this selection, there are some who feel that consumers are given only the choice to take or leave what is on the shelf, but have been provided very little opportunity to initiate or modify changes. This again indicates the need for better communication between producers, handlers, and consumers.

There is much concern today over the amount of the consumer's food dollar that goes for marketing costs. Much of this is due to the increased services and innovations purchased by consumers. These include such things as prepared and partially prepared foods, washed and waxed potatoes, and prepackaged lettuce. Consumers have placed a premium on these services. In order for consumers to intelligently decide whether these services or innovations are a wise choice for them, they need to know what costs are involved and be able to analyze their individual situation in terms of their needs and resources in relation to these costs.

We are aware that physically healthy people make an economically healthy country. It is essential that consumers know what constitutes a nutritionally adequate diet, relative costs of foods in terms of what they contribute to the diet, and the way to care for and utilize these foods to retain food nutrients and for eating satisfaction. Both the physical and economic health of the family are, to a large extent dependent on the skill of the family food shopper. Food takes about 30 percent of the family's disposable income. If the money for food is expended wisely, it will be possible, in most cases, to make other purchases and give additional satisfactions that will help raise the standard of living.

Educational Work With Wholesalers and Retailers

In considering the educational program with retailers, it is important to remember that the work cannot be restricted to retailers as such, but should include activities with wholesalers and secondary suppliers. One cannot be efficient and effective without the other—therefore educational work includes all. There is an industry trend for more specialization and vertical integration through associations of wholesalers and retailers.

Retailing is the most costly function in marketing. Farmers are dependent on the retailer to select, handle, and display commodities that will encourage consumption and please the consumer. Conditions at the retail market will largely determine the ultimate welfare of agriculture. Limited

dissemination of commodity and other practical marketing information for wholesalers and retailers serves to perpetuate inefficient operations. Retailers are first to detect shifts in demand for farm products. It is important that this information get back to producers so adjustments can be made.

Educational work with wholesalers and retailers deals with handling practices, marketing organization, facilities, maintenance of quality, reduction of wastes, trade relations, use of market news, utilization of lower grade and surplus products, training of wholesale and retail personnel, and the over-all operations of management.

Conceivable efficiencies achieved at the grower level that are not understood or acceptable in the market place can prove costly and inefficient. There are many examples of this, such as hydro-cooled peaches. Research studies have shown this process can improve the quality of peaches. Farmers may have practiced all the recommended cultivation and harvesting procedures and invested the necessary money in the cooling equipment, but because of inadequate refrigeration during transit, poor storage conditions and improper handling in warehouses and retail stores, the precooled peaches the consumer gets may be no better than those not precooled. Endpacking cantaloups might provide another example. Research work indicated an advantage for this method over the conventional pack and yet it is encountering resistance by the distributive trade. New York State has a good example of how research results need to be explained to all groups involved if advancements are to be achieved. When research demonstrated the suitable size and kind of consumer package for selling apples at retail, marketing specialists in New York saw the need to get this information simultaneously to producers, packers, package manufacturers, inspection services, retailers, and consumers. Producers and packers needed to know the size and quality of apples most suitable to this method of merchandizing, the kind and size of container, and what equipment and organization in the packing house would be most efficient. Consumers wanted to know why the method of merchandising was changed and the advantages of the new system. This change in methods of marketing called also for some change in State regulations with respect to display, grade, and kind and size of package. Within two years the new pactices were in use by thousands of chain and independent food stores from coast to coast.

Another example of the importance of work in this field of food merchandising is shown by a meat research study in Michigan. This study showed that by rearranging equipment, better organizing the merchandising procedure, and adopting better work methods, labor costs could be reduced 25 to 30 percent. A saving of one cent per pound on the meat purchased by Michigan people would amount to $10 million each year.

Educational work is now going on within the State to help meat handlers utilize the improved procedures.

There are nearly one-half million retail food stores in the United States. The majority of these outlets are independently operated enterprises of from 1 to 10 units, while a total of 20,000 food stores are classified as corporate chains of 11 or more units. Because of the structure of the industry, both at the wholesale as well as the retail level, it is financially impossible for most food enterprises to obtain the professional and technical educational assistance that is utilized by many industries to improve management and personnel performance, increase efficiency, and maintain their competitive position. Yet a smoothly functioning, efficient food distribution system is essential to the general economy and imperative to the maintenance of a strong, productive agriculture.

Program Organization

Educational work with consumers and retailers is not just in the theoretical stage. In many areas work is now under way and expansion is rapidly taking place. Although this is a relatively new field of activity, a growing field and one in which we are continually finding new approaches, evidence to date has furnished us with some recommended procedures which have proven effective. Marketing information programs for consumers are, for the most part, set up on an individual State basis. It is necessary for the administrators and subject matter people involved to take a critical look at the situation within that State. Where are the people located? What problems face consumers? What are the agricultural marketing problems? Where are the major markets? What means are available for getting information out to the people? What information is now being provided consumers? How can the work be coordinated with the total marketing program? What personnel is available to work on this program?

Consumer Information

The marketing information work for consumers must be geared to the consumer's interests. It must be clearly understood by all—producers, handlers, consumers, and educators—that these are not promotional programs. It is my opinion that in launching work in this area this thesis is vital. These programs can and do help producers and handlers, but only in the long run, when the consumer's welfare and interests are considered first. There have been cases where some State producer organizations, and even some economists, have felt no mention should ever be made of any commodity not produced locally. This is a dangerous attitude and one to be guarded against. You can gain the support of producers in your area

for this kind of work when they understand why it is important that the information given be geared to the consumer's interest. We must be honest with consumers if their confidence is to be maintained.

In establishing these programs, we must know the people we want to reach—their income, nationality, occupation, religion, interests, where they are now getting information, buying habits, and a multitude of other facts which will help us to provide information that is pertinent and meets their needs and problems. If we are to be successful, we must reach large numbers of consumers with current, accurate, localized food-marketing information not now available to them. These programs can play a major role in helping consumers become more skillful in making spending and saving decisions, in understanding of economic processes and structure, and adopting shopping practices that make for more efficient marketing. They also help in establishing better communications between producers, handlers, and consumers, and can help research workers know where problem areas are.

The most successful consumer information programs today follow a similar pattern. They concentrate activity in one major city or metropolitan area, or in cases where more funds are available, workers are located in several cities throughout the State. So far we have not found a successful way to operate these programs by having 1 or 2 workers located at the State college and trying to blanket the entire State with consumer information on food marketing. Mass media—radio, television, and the press—are the major methods used in getting information to consumers. The information has to be timely and regular, and these methods make it possible to reach large numbers of people. Only a limited number of meetings are held by the workers. It is too time consuming for the number of people reached. A few such meetings do, however, help the workers keep abreast of food shoppers' interests and in publicizing the program. These programs take the cooperation and understanding of such people as producers, trade, consumers, all extension staff members, resident staff, research workers, other Government agencies, and people in the communication field.

A greatly expanded marketing program is starting in Michigan. I'd like to outline briefly some of the features of this program because the approach takes into account many of the points I have mentioned. There are three groups with whom work will be carried on. Marketing agents will help growers obtain larger net returns from their marketings. Retailers will be given help in lowering operating costs. Consumers will be helped to obtain more satisfaction from their food dollars. At the same time that the educational work is being developed, an expanded research program is also being established. Any lasting and worthwhile program in marketing must be based on adequate research.

Special consideration has been given to assure coordination of the entire program. The Dean of the School of Agriculture and the Director of Extension designated the Agricultural Economics Department as the department responsible for coordinating the extension phases of the marketing program. Even though the person appointed to coordinate the work is in the department of agricultural economics, he will also be working with home economists and others in the various departments who have been assigned responsibility on the project. This program is utilizing people trained in various fields—business administration, horticulture, animal husbandry, information, and home economics, as well as agricultural economics. The consumer information phase of the work will be concentrated in 8 major Michigan cities, with a staff of 13, including both home economists and agricultural economists. Six persons will be working with retailers and 4 with growers. The work with growers will be limited to four well defined areas presenting different commodity marketing problems.

The consumer information work is headed by one person located at Michigan State College. She will coordinate the activities in the eight cities and also help in coordinating the consumer information work with the rest of the marketing program. Consumers in the eight cities will be provided information on availability, price, selection, care, use, and marketing practices for agricultural products. This will be done primarily through radio, press, and television.

Before any permanent plan was developed, Michigan State College staff members involved—resident teaching, research, and extension—as well as trade groups, producers' groups, farm organizations, and legislators, had an opportunity to review the proposed plan and suggest changes. Staffing a program such as this presents a major problem. They have employed the best people they could get, in some cases shifting their present personnel from other duties. They also provided a training program for the new marketing agents before the work actually got under way. In the case of marketing information for consumers, the marketing agents had a 2-week training program during which they received orientation as to the objectives of the work, subject matter information, help with the use of mass media, introduction to staff members who could help them, and an opportunity to meet various farm, trade, and professional leaders in the State interested in the development of this program.

Marketing information programs for consumers have been in operation long enough to provide evidence that they can be successful. We have recently completed the field work on an extensive evaluation study of the project in Louisville, Ky. While not all the data are analyzed, we have found that a large number of people are being reached and helped through the information provided. The Louisville, Ky., consumer information

study was the first of a series to be made in urban areas where an extension consumer marketing specialist is employed. This was a new type of study in four respects, namely, it involved surveying a large metropolitan population, it permitted comparison of four different mass media used by the same person, it was a study of the food-buying habits and preferences of urban families, and it was an evaluation of an entire marketing information program for consumers in an urban community.

As of July 1, work in marketing information for consumers was being conducted in 25 States and Puerto Rico. New work is under way in twelve additional States, not counting the expansion that is under way within some States already having projects. There are four regional projects. These regional projects have been set up in market areas involving one or more States. Regional projects provide an economical and efficient way of doing educational work where the same material and operation is applicable to consumers in participating States.

Education Programs for the Food Trade

The work with wholesalers and retailers started on a commodity approach and is now expanding to broader activities that recognize the functional aspects of food distribution. At the present time, the Extension Service has 7 State offices and 1 regional office, with fulltime personnel working with wholesalers, retailers, and their secondary suppliers in the field of food merchandising. In addition, 16 States have specialists assigned to this work along with other marketing duties.

While the program objective has been one of personal and immediate advantage to the market operator, reported results of this work indicate that growers and consumers received benefits, too. These results include adjustments in operating and merchandising methods and practices that have served to increase efficiency, lower operating costs, reduce spoilage losses, and increase sales.

Local State and national trade groups have not only assisted Extension people in program organization by contacting the retail trade, supplying needed materials for demonstration, and in many instances participating in these meetings and clinics, but are also assuming new responsibilities by serving on planning committees for future work. It has been the approval and assistance of responsible trade leaders that have encouraged the development of food merchandising work to store management problems, such as improved record-keeping methods, situation and outlook materials, and the use of demonstration stores that also serve to test the results of research in new areas and hasten the application of selected improved operational practices.

Educational programs with retailers and wholesalers will call on the

existing resources of the colleges, such as production, engineering, business administration, biologists, and extension economists, but also requires a person trained in wholesaler and retailer distribution to organize and coordinate activities to achieve practical goals. In addition to the contribution that can be made to food marketing in this field, most States have realized additional value to other related projects. Work with the food trades develops contacts that can be helpful in solving farm marketing problems of an emergency nature. An Extension person, aware of trade needs, can perform a valuable liaison function with other production and marketing personnel, as well as with farmers directly. Public information programs should be based on factual local situations of supply, quality, and price—all of which can be gained from close relations with local food wholesalers and retailers.

Research Needs

If the education programs with wholesalers and retailers and consumers are to grow and play their part in effective marketing, there is much information in the research field that needs to be considered. We need more accurate information on what consumers want, what information they do not now have, nutritional deficiencies on a more localized basis, and how we can help the marketing system to reflect consumers' wants and needs most accurately to handlers and producers. In the work with retailers and wholesalers, there is need for less concern with individual commodities and more comprehensive research than that typically represented by reported studies to date. An approach to this is being accomplished through regional studies which serve to pool finances, personnel, and facilities. Within the existing framework of research, the most valuable contribution could be in the area of management records. No standards of operating performance on a departmentalized and store basis exists that is adequate for varying sizes of food store operation. Here is a continuing area of investigation that would be welcomed by Extension and also by the trade. Another possibility exists in the area of outlook information. Still another concerns where produce prepackaging should be done. Unfortunately, we have no sound basis for deciding whether the trend is for shipping point, terminal market, or at retail. We have had many commodity marketing studies in the past few years that have measured consumer acceptance by varying types and sizes of containers displayed in varying ways. Research has shown mainly the reaction of customers in terms of sales, usually in the short run. It would be of value if we could discover the impact of change or changes as they affect people's buying attitude and also the effect that experimental changes have on the efforts and attitudes of management and store personnel in terms

of interest, care, and productivity. These are only a few examples of research needs for educational work with consumers, wholesalers, and retailers in the field of marketing.

Marketing information programs for consumers, wholesalers, and retailers can make a major contribution in providing an opportunity for these groups to make intelligent decisions that will contribute toward more efficient marketing. These programs offer a real challenge to all of us interested in agriculture, and especially to agricultural economists, in helping develop them along sound lines.

DISCUSSION

RAYMOND J. PENN
University of Wisconsin

I am sure we are happy to have this excellent and comprehensive paper on consumer and retailer education by Miss Ueland. Gale probably as much as anyone, is responsible for the expansion of this type of work by the Extension Service. And it is expanding. Recently I had the opportunity to participate, as a "pinch hitter," in a meeting of State Extension Directors in Chicago. The meeting was called by Administrator Ferguson for the purpose of (1) pooling extension marketing experience, and (2) encouraging additional marketing extension particularly with the 7 odd million dollars increase in Extension funds available this year. The Extension Directors focused a good part of their attention on consumer and retailer education. The program is now big and as Miss Ueland has told us, it is rapidly expanding. This requires sound as well as big plans.

Here are three comments primarily addressed to consumer education programs.

(1) The horizons of a consumer education program are wider than many of us ever dreamed. We started in an effort to dispose of surplus agricultural products. In fact the main basis of financial support still is that consumer education will increase farm incomes or reduce the need for costly production adjustments —it will increase the consumption of agricultural products. But, as Miss Ueland pointed out, an effective consumer education program must be consumer oriented. It must inspire consumers' confidence and be useful to them. If this is accomplished we may not always end up with increased quantitative consumption of agricultural products. Most of the consumer education programs are now concentrating on helping to make the food dollar go farther,—better nutrition, better health, less waste, more of the foods the consumer likes, and new ways of using food. As we do this job we will soon realize that the consumer's food dollar is like all his other dollars. An educational program on food will be meaningful to consumers only when a part of their total experiences, alternatives, and hopes.

Decisions on which foods to buy and when are only a small part of the network of decisions the consumer has to make on managing time and money to

get the most out of life. We have, it seems to me, just opened the door on one small part of an urban educational program. And I doubt whether most of us yet comprehend the magnitude of this small part. From my experience with consumer and other urban groups I am convinced research and educational institutions cannot dodge the responsibility of developing an urban educational program even if they wanted to. The need and demand is present.

(2) A consumer oriented educational program must, it seems to me, be a very broad one encompassing a wide range of experiences and knowledge. If we are to bring competence to such an educational job without prohibitive costs, it is particularly important to tap the personnel and facilities of our great research and educational institutions—only they have the ideas, information, research techniques and educational know how in the many fields required. A marketing man and a home economist, or even a dozen of them, aren't anywhere near enough to do the whole job in a metropolitan area. We need the skills of these folks and the energetic support—which by and large we have had—of trade groups. But I do not believe that agriculture can or should expect to do a job of this magnitude alone. A consumer oriented program, if it results in better consumers' decisions should coincide with the long run interests of agriculture. Although the support for consumer education has thus far come from agriculture, certainly this base should be rapidly expanded to include the urban community. A sound consumer education program will probably not increase the consumption of all agricultural products, and we may expect occasions of direct conflict of interest between producer and consumer. When that happens, the decision will have to be in the consumer's favor if we are to merit and hold his confidence. Perhaps the biggest contribution we in agriculture can make, and it is an extremely important one, is to lead the way in urban education by drawing from our experience in agricultural extension. We can in our design of consumer education programs show how the research and educational institutions can contribute to an urban program as the Colleges of Agriculture and USDA have contributed to agricultural extension. I am convinced, too, that the University of the future will have an educational program for all its constituents patterned, in part, on our agricultural extension experience.

(3) A word of caution. It is possible to spend almost unlimited amounts of money on a program of this type and I am not sure we have very good standards for judging the results. Continuous and critical evaluation of the program is difficult but essential. It is not enough to ask "Are we selling the surplus?" "Are we increasing consumption?" Nor is it enough to ask, "How many people are we contacting?" We can, I think, apply some of our experience in agricultural extension to this urban program. We know that the value of an agricultural extension program depends on how well it serves the farm people. Our extension personnel are expected to have a thorough understanding of the experience, feelings, needs and desires of farm families. The personnel must evaluate the program in terms of how well it serves farm families. In addition, the agricultural extension program is being continuously evaluated by the county program planning committees. The extension program has grown from the farm people—they keep changing it to meet their needs. It seems to me the best way to evaluate a consumer education program follows the same pattern. (1) Personnel in the program working with consumers should thoroughly understand the setting in which consumer decisions are made. (2) If consumers

will take an active part in formulating the program, they will be continuously changing it to better meet their needs.

We don't try to work out an extension program in agriculture and then impose it on farmers. If that works at all, at least we know it doesn't work as well as having a program which farm people themselves help us build.

Are urban consumers different? Don't we have to accept that they, too, are going to have to be active partners and, in fact, leaders in our consumer extension plans? Getting consumers actively participating in an educational program is new to most of us. But it is, I think, essential to a successful program. We should leave no stone unturned in our efforts to bring it about.

BUYING MILK ON A SOLIDS-NOT-FAT BASIS

Chairman: Leland Spencer, Cornell University

THE PLACE OF FAT AND SOLIDS-NOT-FAT IN PRICING MILK FOR MANUFACTURING

HUGH L. COOK
University of Wisconsin

Plan of Approach

THE price of milk is a complex thing which includes the values of fat solids and nonfat solids, perhaps values for location and form and perhaps a negative value for bacteria. We can't price everything of value in milk and we therefore focus on trying to measure relative values of fat and nonfat. We will continue to have problems in assigning the other values of milk to the fat and nonfat components.

I shall approach this subject by discussing the need for more satisfactory pricing of the fat and nonfat components of milk produced for manufacturing (a) at the farm level, (b) in sales of manufacturing milk or products between plants or middlemen, (c) in pricing to consumers. I shall assume the following criteria for what is satisfactory.

Criteria

A pricing system for milk should rapidly and accurately translate changes in consumer desires back through the marketing structure and tell processors, other middlemen and farmers what consumers want. It should rapidly and accurately pass a saving in processing or handling forward to consumers or backward to farmers. It should encourage progress and growth, in the general economy as well as the industry itself. These criteria are long-run in character. We should acknowledge that in the short-run the most desirable adjustments may arise from supply conditions, in which case an efficient pricing system may be one that rapidly clears surpluses and so on.

With specific reference to milk we also should acknowledge that pricing schemes which look satisfactory at the manufacturing milk level may not have a satisfactory effect at the fluid milk level. Manufacturing and fluid milk pricing schemes should be fitted together or at least examined to assure that they do not work at cross purposes. Concepts of pricing may not be suitable everywhere, in surplus and deficient areas alike, as well as among areas with sharply different physical composition of the milk supply.

Having assumed some general criteria for what is satisfactory and acknowledged the complexity of the subject, I next shall discuss the pricing

problem, which tends to be general, and proceed to typical proposals of pricing plans for the farm level, where any changes in the composition of the milk supply must be brought about.

The Problem

In recent years, particularly since the beginning of World War II, increased emphasis has been placed on the nonfat constituent of milk. Various market data are usually interpreted to show a decline in consumer desires for the fat component relative to the nonfat.

If this interpretation is correct, then one could argue that milk fat is in over supply relative to nonfat. It would follow that the over-all pricing problem is to find the price that will clear the market of the minimum amount of fat biologically possible to achieve in a milk supply and make it possible for consumers to bid up nonfat prices by an amount which, when added to this fat value, will bring forth the needed supply of milk. Certain pricing practices prevent the reflection of spot market conditions, particularly at the farm level.

For example, the price of manufacturing milk is often quoted on a butterfat basis. Manufacturing milk markets have reflected an increase in demand for the nonfat but have imputed this value to the fat. This is to say that average hundredweight prices have been higher as nonfat values have increased, but generally the quotations have been in dollars per pound of fat, especially in prices to farmers.

Even when prices have been quoted on a whole milk basis they have varied in direct ratio to butterfat test, a common practice for the last 60 years. Some exceptions to this method should be acknowledged, especially in the cheese and evaporated milk industries. The direct ratio pricing method assumed that (a) the nonfat content varied in direct proportion to the fat, or else that its value was unimportant relative to fat, and (b) that all costs were in direct proportion to the fat content of milk.

These assumptions are incorrect. According to the Jacobson tables explained below, a hundredweight of milk testing 3% fat normally has 8.27 pounds of solids-not-fat while 6% milk has 9.47 pounds of nonfat. The first has a ratio of 1 to 2.76 and the second a ratio of 1 to 1.58. Each pound of fat in a 3% milk has more than an extra pound of nonfat compared with each pound of fat in a 6% milk.

On the cost side, some items vary with the volume of milk independently of solids content, and others vary with the fat and nonfat solids content. Since nonfat solids do not increase in direct proportion to the fat, the cost assumption implicit in the direct butterfat ratio method of payment likewise is incorrect.

Thus the quotation of milk prices on a butterfat basis and the direct

ratio method of calculating differentials do not distribute market proceeds from milk to reflect spot market values of the components. This involves the equitable distribution of income. There is also the problem of inducing shifts in production in accordance with changes in relative market demands for the respective components. Farmers, by and large, have not seen the change in relative net values of high and low testing milk or, if they have seen it, have made very little adjustment to it. This suggests that consumer desires may not be adequately *expressed* by the market. I shall expand on this point later, and now discuss pricing at the farm level.

Pricing at the Farm Level

To the best of my knowledge the first producer pricing plan based on the principle of differential pricing of milk components was developed by Froker and Hardin early in 1942. More recent work has built on this principle. I shall describe this plan and briefly mention examples of more recent work in terms of what it added to the Froker-Hardin recommendation.

The Froker-Hardin Plan

Purpose: Broadly stated the purpose of the Froker-Hardin plan was to price farm receipts so that each farmer got for his milk a price based on what the dairy plant or handler was able to realize from it or from the products it yielded.[1]

Essentials: The details of the plan dealt mostly with arriving at the appropriate price differentials for fat and nonfat components of milk. The plan had two parts: (1) a price per hundredweight of milk of a given test, such as 3.5% fat and (2) a price differential for each change of 0.1% fat and its accompanying .04% change in solids-not-fat. The plan contemplated no change in the current method of calculating the initial price for the average test within a particular plant. The initial price might be arrived at by (1) pooling of market proceeds, (2) bargaining, (3) competition, (4) formula, or (5) government action. Whatever the price per hundredweight for the average plant test, the purpose of this plan was to distribute the proceeds equitably among producers who deliver milk of various tests.

Since no practical test was available for measuring solids-not-fat content of the producer's milk the authors found it necessary to accept some standard equation for estimating the amount of nonfat solids associated with a change of 1% in fat. For this purpose the Jacobson tables were used. They were based on an analysis of 150,000 samples of New England milk, the most extensive study of milk composition in recent years. Subsequent

[1] Rudolph K. Froker and Clifford M. Hardin, *Paying Producers for Fat and Solids-Not-Fat in Milk*, Wisconsin Research Bulletin 143, February, 1942.

studies differing somewhat from Jacobson are touched on later in this paper. According to the Jacobson tables, as indeed with other studies, the nonfat content increased as the fat test of the milk increased but not as much percentage-wise. The Froker-Hardin plan was worked out to apply to each of the major product combinations in dairy plants. The basic concepts were the same for all product combinations excepting condensery milk and milk for fluid use.

Application: Because of this similarity the butter-powder calculation may be taken as an example of how the plan was applied. It was applied in the following steps:

(1) The price which a creamery was able to pay producers per hundred pounds of milk of average plant test was determined by dividing the total amount of money available for distribution by the hundredweights of milk.

(2) Standard yield figures for butter per pound of fat and powder per pound of nonfat were multiplied respectively by 0.1% for the fat and by .04% for the nonfat.

(3) Direct costs were determined separately for butter and for powder. Direct costs represented that part of the complete cost which was associated with and varied according to the quantity of fat and solids-not-fat in milk. These included the expense of handling, packaging, and marketing of butter, for example, together with a reasonable part of the general plant and overhead expense. These costs were contrasted to those that varied with the volume of milk handled, called receiving costs in the Froker-Hardin study. The general plant and overhead expense to be allocated in part to butter were prorated on the basis of the proportion of plant time and effort actually used in handling, packaging, storing, and marketing the butter as distinguished from handling the milk itself. Naturally this allocation involved an element of judgment. Direct costs for powder were obtained similarly.

(4) Butter prices and powder prices were to be determined, if possible, from the actual records of the plant; if not, from wholesale quotations. The formula to use for the butter-powder price differential was then constructed as follows:

$$.121\left(\begin{matrix}\text{butter}\\ \text{price}\end{matrix}-\begin{matrix}\text{direct}\\ \text{costs}\end{matrix}\right)+.041\left(\begin{matrix}\text{powder}\\ \text{price}\end{matrix}-\begin{matrix}\text{direct}\\ \text{costs}\end{matrix}\right)=\begin{matrix}\text{butter-powder price}\\ \text{differential}\end{matrix}$$

Based on this same principle, formulas were constructed for the butter-casein combination, the cream-powder combination, the cream-casein combination, various types of cheese made from standardized and from unstandardized milk and so on.

A somewhat different concept was recommended for the condensery pay formulas. The authors said this was because the prices paid to producers by condenseries did not follow as closely the wholesale price of the manufactured products as is the case among creameries and cheese factories and because manufacturing costs were not so well established. Two methods were developed for determining price differentials for condenseries. One method was called the alternative value method and the other the supplementary value method. In the alternative value method an adjustment factor was developed based on the relationship between the calculated butter-powder value of a hundredweight of milk and the condensery price. This adjustment factor was then applied to a calculated butter-powder price differential.

The supplementary value method allocated to the fat the premium or discount in the condensery price relative to price of milk used for butter-powder, but was called good enough so long as condensery prices were close to butter-powder milk values.

Recent Plans

Time here does not permit detailed summary of the several pay plans that have been recommended since publication of the Froker-Hardin plan. They appear to follow the same basic concept and to aim for greater precision in the formulas. Some examples follow:

Clarke and Hassler in 1953 published a bulletin which used an equation for estimating nonfat from fat based on analyses of California milk by Prof. Jack, and applied the net value concept to development of formulas for condensery milk.[2] They used some yield figures developed in Hassler's work on pricing efficiency in manufactured milk.

Scott Walker in 1953 argued for use of a single joint cost figure to avoid the [rather minute] error which may arise in allocating the overhead part of the so-called direct costs as between butter and powder.[3] He applied some cost and yield figures from his study of functional relationships in a sample of butter-powder plants in the west.

Norris Pritchard has recently reported a study of procedures for establishing price differentials for fluid milk. He contributes a formula for differentials to be used in conjunction with use-class prices paid by handlers, as well as one for producer prices.[4]

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[2] D. A. Clarke, Jr., and J. B. Hassler, *Pricing Fat and Skim Components of Milk*, California Agr. Experiment Station, Bulletin 737, August, 1953.

[3] Scott A. Walker, "Pricing Milk to Farmers at Butter-Nonfat Dry Milk Plants," *Agricultural Economics Research*, U.S.D.A., October, 1953.

[4] Norris T. Pritchard, *An Improved Method of Pricing Fat and Nonfat Solids in Milk*, Agricultural Marketing Service, U.S.D.A., July, 1954 (processed).

Work on More Accurate Nonfat Estimates and Tests

Louis Herrmann and associates made a study of the accuracy under commercial conditions of several commonly used methods of estimating the solids-not-fat content of milk.[5] They found that when specific gravity is included in the estimating equation the standard error of estimate is reduced.

The specific gravity readings were done by lactometer. The authors say that a method developed by Paul D. Watson, of the Bureau of Dairy Industry, gives promise of a substantial improvement in the accuracy [and speed] with which solids-not-fat content of milk can be calculated under commercial conditions. Watson's method is reported in Agricultural Research.[6]

Although Herrmann recommends no pricing plan this work contributes to the precision of pay plans which use estimating equations for nonfat. When nonfat tests are developed that are practical for patron's milk, pay plans based on the principles I have discussed will still be useful. Patron prices for various tests should still reflect the net value of both fat and solids-not-fat. Actual test readings may be substituted for the estimates from Jack's, Jacobson's or Herrmann's equations and these readings multiplied by the appropriate yield figures can be used in the pricing formulas.

Appraisal of these Plans

Now briefly to appraise the plans for paying producers according to our criteria of a milk pricing system. I want to suggest two points:

(1) These plans have a place in pricing milk. To the extent that the market is properly expressing changes in consumer tastes and reflecting these changes back to the manufacturing plants that buy milk from farmers, these plans answer our first two criteria. They accurately reflect market values of the milk components to the producers of various tests and by the net value calculation they quickly pass on a change in direct cost within the plant. These plans encourage progress and growth to the extent that the market encourages progress and growth. While the principle underlying these plans is appropriate, the reflection of consumer desires is blurred because consumers have not had adequate opportunity to express their desires for fat and nonfat within each form of manufactured product.

(2) The second point is that it is doubtful whether these reflections unless magnified can be effective in bringing about the indicated shifts in

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[5] Louis F. Herrmann, Elsie D. Anderson and Frank A. Bele, *Estimating the Solids-Not-Fat Content of Milk*, U.S.D.A. Marketing Research Report No. 65, May, 1954.

[6] *Agricultural Research*, Vol. 2, July, 1953, No. 1, p. 15.

production, because of time lags and other restrictions on farm production processes. Let me illustrate this one.

So far as we can now tell, the recent trends suggest the need for a lower testing milk supply in the aggregate. For the individual farmer the needed adjustment would be to select the heaviest producers of volume from among his cows with the highest total butterfat production record. Decreasing test without increasing production results in a less efficient cow which will give smaller returns.

To return to the kind of adjustment needed in the aggregate, one could argue that an ideal producer pricing plan would have caused farmers to reduce test, *if* the market were adequately expressing to the receiving plant the relative decline in consumer demand for fat. Has the average test been reduced? The Froker-Hardin plan has been in use by some Wisconsin plants since 1942 and it was estimated early in 1953 that 50% of the Wisconsin plants buying milk for manufacture were using the plan. We have no survey of these plants as a group, but spot checks cast doubt that it has reduced test to any measurable degree. Medford Cooperative Creamery had an average test of 4% fat in 1942 when the plan was put in; it is still 4%. Consolidated Badger Cooperative uses this plan on manufacturing milk and the Chicago differential, which is relatively lower, on the Grade A milk. In this concern, the test of the Grade A milk has been reduced more than the test of the Grade B milk. Official reports show the average fat test of manufacturing milk for the state as a whole has not been changed. There has been a slight increase in creamery and cheese milk tests and a slight decrease in market and condensery milk tests compared with 1934-41, in neither case more than half a point.[7]

But on logical grounds one must argue that this is no fault of the plan. It reflected the incremental value of fat and nonfat according to the spot market. However, the spot market situation confronting the patron's plant did not express what was generally concluded to be consumer desires with enough clarity and force to bring about production response. Adoption of a plan accurately to reflect market values, therefore, was not enough.

Effect of price supports: The government standing ready to buy unlimited quantities of butter at one price—in recent years a price higher than will clear the market—has been one reason why there has been little expression to the manufacturing plant of the relative decline in consumer demand for fat. Any fat that cannot be sold in fluid milk, ice cream, cream, butter, or what have you, at satisfactory prices has been dumped to butter utilization and so to the government. Thus butter prices used in figuring the differentials for fat have not declined enough to pull down differentials

[7] See Wisconsin State Department of Agriculture Special Bulletin No. 32 and Bulletin No. 250.

to the extent that may be required to get a producer response. To work for added refinement in ways of calculating differentials in this kind of administered market price situation is like filing the point of a needle when a blunt-pointed spike would do the job. I suppose we are all critical of the present method of price supports for dairy products, whatever our different viewpoints as to the alternatives, so I won't labor the point.

Pricing Between Middlemen

Dairy products are frequently exchanged between middlemen with about the same set of pricing institutions as referred to above, which may not reflect properly the relative values of fat and nonfat. This results in more of a problem with some commodities than others. Butter, powder, evaporated, bulk condensed skim and fluid skim pose no problem in this respect. Since butter, powder and evaporated milk are finished products yields are irrelevant. Since their compositions are defined by standards, their components cannot be varied, and middlemen have no problem of pricing the incremental values of separate components. Of course, if reforms were made to permit better component pricing at the retail level, attention would be needed to assure that these relative prices were reflected back through the system. There is no problem on bulk skim which is sold in large enough lots to justify the time and expense of accurate tests for solids. However, 40% cream for ice cream is usually priced on basis of the wholesale butter market, for example, Chicago butter times a factor plus transportation, the factor varying with market conditions. Though these cream prices include some value of the nonfat solids as well as changes in supply and demand for cream itself independently of butter—two criticisms apply to this method of pricing (1) there is no recognition of the added nonfat in cream skimmed from high testing milk compared with that from low testing milk, and (2) the value of the nonfat is imputed to the fat.

Sales of whole milk from one manufacturing plant to another are usually on a direct butterfat ratio, thereby posing the same problem as in sales of 40% cream, except that it is more serious with respect to the incremental value of nonfat associated with the fat.

Use of the Froker-Hardin type plan at country points would tend to take care of these situations in a sellers' market because country plants would take these differential values of nonfat into account in their asking prices. However, in a buyers' market pricing methods used by the wholesale receivers, or plants buying manufacturing milk from another plant, in making their offers will be the ones on which sales are made. Therefore, there seems to be a need for some form of differential pricing for nonfat at the wholesale level of sales for the products named. For whole-

sale cream, this might mean little in terms of total value; ice cream manufacturers, for example, probably use about the same amounts of 40% cream in a mix regardless of the nonfat test, and so the nonfat adds little value and might not change the differential. The chief effect in this case might be to avoid imputing all the price to the fat component. Even though middlemen may understand how much nonfat value their cream prices include, nevertheless they become quotations for use by those without such understanding.

Pricing to Consumers

By and large consumers get finished products and so the differences in yields are irrelevant to them. Also the products are usually defined by standards which, if taken as given, means that it doesn't matter what value consumers attach to the separate components. However, according to our criteria of a pricing system these standards should not be taken as given.

Because consumers have so few choices and so little information about the components, the retail market does not accurately price the value of a pound of fat relative to a pound of nonfat. This would be so, only to a lesser extent, even if we had no government participation in dairy marketing. I can make my point most simply by a personal illustration dealing with fluid milk. Beginning with an unstandardized 3.0% milk, I would pay as much for an extra pound of nonfat solids as for an extra pound of fat. Assuming that many others would do the same, there is no satisfactory way for the retail market to show this fact to processors or farmers, chiefly because we don't have enough choices and enough information when we buy.

If I had the choices I would need to be told what they were. *Intellectually*, I have the choice made, but *by taste* I couldn't tell the difference between 3% milk unstandardized, 4% of any kind, or 3% with an extra pound of fat, assuming that all were homogenized, unless I were tasting them together on a taste panel of some kind.

This, therefore, is a deficiency in the functioning of the retail pricing system. Namely, that it does not serve to express relative consumer desires for fat and for nonfat back through the marketing system to farmers. Since desires are not adequately expressed, the trends are not made apparent to farmers with sufficient accuracy, nor speed, nor force for farmers to make rational adjustments to the future.

Some unanswered questions will serve to illustrate the inaccuracy of the retail pricing system for expressing relative desires for fat and nonfat. How much do we know about whether consumers will pay more for milk and dairy products with a high butterfat test? Will they pay more for

a high nonfat test? How much more? What size increments can they recognize? How much consumer information either by advertising or labeling must accompany sale of the product if they can't recognize small increments of fat and nonfat by taste and inspection? Consumer markets do not answer these questions very accurately. Perhaps the problem is most serious in fluid milk and ice cream, though in some way it applies to all dairy products.

Butter and nonfat powder are about the only products in which fat and nonfat are marketed separately from plant to consumers and on which we have fairly good wholesale quotations. We have had to depend heavily on these as indicators of values consumers attach to fat and nonfat components. If relative consumers' demand falls for butter it may not mean that they want less fat in cheese and so on. Consumers may not attach the same values to fat and nonfat in fluid milk, ice cream, evaporated, and cheese in the proportions as they do in butter and powder. Yet the proportions in which consumers get fat and nonfat in cheese, evaporated, and ice cream as defined by historical standards may have been based more on trade custom or by legislation by pressure groups than on consumer preferences in the first place. As time goes on these standards may become even further removed from consumer desires.

Does Consumer Pricing Encourage Progress and Growth?

Even if we had adequate expression of consumer desires at the retail level this might not alone be enough to induce farmers to adjust to it. After the general trend becomes apparent it takes a long time for dairy farmers in the aggregate to make the needed adjustments, because of the nature of dairy production. Let us assume, for example, that the retail price relationships between fat and nonfat clearly favored low butterfat testing breeds and low testing cows within each breed. The interests of the individual farmer would require selecting the cows that produced the highest volume *from within* his group of cows that have the highest total butterfat production. He culls, let us say, 20% of his herd per year, making replacements from his own two year olds according to the above scheme. Even with an orderly program of this kind, the producer would still need 5 years to turn over his herd on this principle.

Perhaps one could argue for some form of forward pricing to urge farmers to begin the adjustments which according to trends will be most profitable to them in the future. This could mean that government and industry price leaders would deliberately set butterfat differentials at levels to encourage change in the direction shown by the trend in relative consumer desires for fat and nonfat. This might mean setting differentials now at levels the trend shows should prevail 5 years from now. It would

not have to affect the level of milk prices relative to other farm prices. If we are correct in assuming that consumer desires for fat have declined relative to nonfat, it would almost surely mean a reduction in butterfat differentials compared with those which would prevail under the Froker-Hardin type plan, at least in places. We now have applied such arbitrary differentials in some fluid milk markets.

As a basis for these administered differentials, we would need better expression of consumer desires for fat relative to nonfat than we now get from the retail market. For consumers adequately to express their desires they need more variety in products with various compositions, experimentally priced, and more information by way of labeling, advertising or what you will.

The least wasteful and the most accurate way to give this to consumers and to measure their response would be by controlled experiments in the market, probably sponsored by appropriate trade associations. We know that it is wasteful for all dealers to process and handle a great variety of items. Experiments would need to go on continuously, and in several areas. Changes in tastes or in technology which go on all the time might reverse, for some segment of the dairy economy or some area, what seemed to be clearly established as the most desirable thing to do. An example of such a reversal is furnished by Dave Clark in a recent article in the Farm Policy Forum where he points out that if we wish to develop supplies of milk of more concentrated form we might want to put a premium on high testing milk in excess of market value of the components.[8]

I have recognized above that some fluid markets such as New York and Pittsburgh already are deliberately allocationg a value to butterfat differentials below the current market value of fat. In addition to encouraging producers to adjust more rapidly for the future, another argument for this is to encourage handlers to use more fat in milk and ice cream since it costs them so little.

We may conclude by observing that the pricing system for fat and nonfat in milk is not performing satisfactorily. It is reasonable to expect that at least the following things would help: (1) quote prices on a whole milk basis in all cases where possible; (2) establish differential pricing of fat and nonfat solids at plant and wholesale levels; (3) get the government out of the butter market; (4) conduct research at the consumer level in the manner discussed; (5) continuously re-examine our product standards and definitions of identity which tend to impose some historical consumption pattern on consumers.

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[8] D. A. Clarke, "The Butterfat-Skim Milk Relationship," *Farm Policy Forum*, Summer, 1954.

DISCUSSION

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Professor Cook's conclusion, and mine, is that milk for manufacture should be priced so as to reflect differences in net values of the products made. It is not surprising that we arrive at identical conclusions, for few would argue that the difference in price between two loads of milk should not be such as to reflect their differing values in the market.

We arrive at identical conclusions by differing routes, however. Cook calls upon several criteria, including to "encourage progress and growth, in the general economy as well as the industry itself," and ". . . in the short-run the most desirable adjustments may arise from supply conditions." His listing of criteria, and his paper in general, tend to exaggerate the importance of the problem under discussion, which is really a minor one in the dairy pricing field.

My own single criterion is based on the primary functions of price, namely, to ration scarce goods among consumers and to bring forth supplies of goods demanded by consumers. The principle which seems best to follow in establishing a price differential for manufacturing milk of varying composition, based on these functions, is that it be so established that buyers are indifferent as to the butterfat and solids-not-fat composition of the milk received. In other words, price differentials to handlers should be such that, insofar as is possible with an administered price, milk of each and every butterfat and solids-not-fat test is equally profitable.

Details of pricing at the farm level

Differences among the various suggested plans are so small as not to be worth quibbling about. One uses the Jacobson formula of an increase of 40/100 of a pound solids-not-fat for each increase of one pound of fat in a hundredweight of milk. Another uses the Jack relationship of 44/100 instead of 40/100, and another the Herrmann equation of 43/100. All would use actual tests of differences in solids-not-fat if a simple direct testing method were had, and if the value of the differences were sufficient to justify the cost of making the additional test for solids-not-fat.

Yield figures vary slightly among the different plans. Also, some plans divide the direct costs between different products, and others deduct all costs as a single item.

These differences are of little importance, although the more accurate measures, of course, as revealed by experience and research, are to be preferred. But for simplicity, some "rounding off" in the price differential is desirable anyhow. And the important consideration is whether a method meets the criterion of being such that buyers find milk of varying tests equally profitable, and, hence, are indifferent as to the composition of milk received.

Consumers' alternatives

A significant point with which I am in full agreement and would like to emphasize is this: Sellers frequently do not provide consumers an opportunity to express their preference for fat and nonfat. Sometimes this decision is forced upon the seller, witness legislation in some states prohibiting fluid skim milk

to be sold which is fortified with additional solids-not-fat. At other times, the seller can use his discretion, but prefers the status quo. Whatever can be done in the way of changing legislation and marketing practices so as to give consumers more adequate opportunity to express their desires certainly should be encouraged.

Forward pricing

Estimates of future price relationships so that present differentials could be calculated on expectations is of doubtful value. Pricing on the basis of the present market is probably good enough.

Cook apparently arrives at this suggestion because of a belief that present market prices over-value the fat and undervalue the solids-not-fat. This I doubt. Market-clearing prices for solids-not-fat probably are below present support levels by a greater percentage than market-clearing prices for butterfat. It is true that a domestic dumping scheme for solids-not-fat, that of government purchase at about 15 cents a pound and sale for livestock feed at 3.5 cents, has provided an outlet for stocks of nonfat solids. But a much less drastic scheme probably would move current butter stocks into consumption. Purchases under the butter program have been most widely publicized, yet purchases relative to production under the support program have been much heavier for solids-not-fat.

With present price differentials and those of the past 20 years favoring low-test cows in manufacturing areas and in most fluid markets, educational programs making farmers more aware of the situation probably need to be accelerated. Many D.H.I.A.'s need to change their record-keeping so as to emphasize milk yields of cows, not just fat yields. Bringing extension teaching up to the present price situation appears to be more important than to base price differentials on expected market prices five years from now.

Butterfat or solids-not-fat differentials?

Another point which Cook fails to emphasize is that as between milks of varying composition, the change in the value of the butterfat is about 25 times as great as the accompanying change in the value of solids-not-fat. Although there has been a trend toward an increased share of the basic price of a hundredweight of milk resting on solids-not-fat, a trend which probably will continue, the price differential among milk of varying composition is still largely a butterfat differential and is likely to remain so for many years to come.

Differentials for fluid milk

In contrast to being nearly in complete agreement with Cook (except that I think he exaggerates the importance of this particular problem among those in dairy pricing), I find myself in disagreement with some of the recent literature on price differentials for milk in fluid uses. In a July 1954 publication of the USDA entitled *An Improved Method of Pricing Fat and Nonfat Solids in Milk*, the second word in the title seems hardly appropriate.

It is recommended in this USDA report that for Class I milk the price differential should be arrived at by multiplying the butter-powder differential by the ratio of the Class I price to the butter-powder value of milk. But, as Cook points out, "consumers may not attach the same values to fat and nonfat

in fluid milk . . . in the proportions as they do in butter and powder." Simply because the price of snap beans is twice as high in Virginia as in Wisconsin does not mean that prices of all vegetables should be twice as high. Stated another way by Clarke and Hassler, ". . . there is no logical reason why the fat and skim components of market grade milk either would or should bear the same relation as those established by the butter and the dried milk solids market. . . ."[1]

In fluid markets as at manufacturing plants, the proper criterion of a price differential for milk of varying composition, it seems to me, is whether it is so established that dealers are indifferent as to the butterfat and solids-not-fat test of the milk received. Admittedly, application of this principle to Class I milk pricing is difficult, for the number of quart bottles of milk filled from a hundredweight of milk is the same no matter what the test—only the composition of the contents of the quart container changes. Two steps, therefore, are suggested in the application of the principle I have outlined.

First, if consumers are not willing to pay as much for butterfat in fluid milk as it is worth in the highest valued alternative manufactured use—fluid cream, in the Northeast—they should not be given the fat in milk. To sell butterfat in a low-priced market when a higher-priced market is readily available does not make sense. So as a minimum, the butterfat differential on Class I milk should not fall below the net value of the fat if the milk were standardized, and the fat removed were used in fluid cream.

Secondly, the trial and error method should be followed in the application of the principle. Does this minimum differential really make dealers indifferent as to the butterfat test of milk receipts? If the market is flooded with milk, and dealers turn off producers or reject milk, are the producers whose milk tests below the average affected first? Do dealers or cooperatives write letters to farmers telling them that their milk will not be salable unless they increase the butterfat test? If so the minimum differential is too low, and should be raised slightly. The method suggested in fixing Class I price differentials, then, is that of a precise calculation of a minimum differential followed by adjustment upward if handlers still prefer milk with a relatively high butterfat test.

Although Cook does not discuss particular methods of determining price differentials for butterfat and solids-not-fat in Class I usage, since they lie outside the scope of his assignment, his arguments lend support to the method outlined above rather than to an "inflated" butter-powder differential.

[1] *Pricing Fat and Skim Components of Milk*, D. A. Clarke, Jr., and J. B. Hassler, California Agricultural Experiment Station Bulletin 737, August, 1953.

THE PLACE OF FAT AND SOLIDS-NOT-FAT IN PRICING MARKET MILK

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AN INCREASING amount of comment both written and verbal is being made concerning the use of solids-not-fat in pricing market milk. One proposal is to price fluid milk on an energy basis.[1] Another proposes to use the nutritive values of milk priced in terms of competing nutrients.[2] Others propose merely that less emphasis should be placed on fat and more on solids-not-fat in pricing milk for fluid use. Many of these comments are such as to imply that fat is presently the sole criteria in determining fluid milk prices.

One can easily draw the conclusion that an understanding of how milk for fluid use is priced is not thoroughly understood even by agricultural scientists. Perhaps, even though such knowledge is not lacking among individuals present, a first task of this paper properly can be a systematic summary of how market milk is priced currently and the place of fat and solids-not-fat in such pricing.

It is possible that an increased emphasis could be placed on solids-not-fat by completely revamping pricing methods for fluid milk. For example, by pricing on an energy basis, such a change would be accomplished. A drastic change of this sort has small chance of developing. Increased emphasis is likely to result from some modification of present pricing systems. Therefore, the second task of this paper will be to explore some modifications that would provide an increased emphasis on solids-not-fat. As these possible modifications are developed the paper will indicate some criticisms of present methods.

The third task of this paper will be to discuss impediments to giving heavier weighting to solids-not-fat in pricing market milk. In doing so an attempt will be made to point out how these considerations might be resolved to permit solids-not-fat to occupy a more prominent place in the pricing of market milk.

Pricing Market Milk

In a large majority of the principal market milk areas in the United States minimum prices for milk are determined according to rules contained in federal and state orders. These pricing orders have certain

[1] Material presented at the Twenty-first Annual Meeting and Convention Oregon Farm Bureau Federation, Baker, Oregon, Nov. 17-21, 1952, by G. A. Richardson, Department of Dairy Husbandry and Dairy Chemistry, Oregon State College.

[2] E. J. Whittier, "A System of Payment for Milk." *The Milk Products Journal*, Jan., 1954.

principles in common. First, they establish charges of handlers for milk according to a classification based on uses made of the milk. Second, they provide a method for dividing the proceeds from the sale of milk to handlers among producers.

Under federal and state orders the pricing process for market milk can be thought of as consisting of the following four steps:

1. The determination of class prices to be paid by handlers for milk of a specified standard. The standard stipulates a butterfat content, for example 3.5 per cent, and a delivery place, for example at plants in the marketing area. The quoted Class I price also may be for a particular standard of quality.

2. The second step is the determination of variations in charges made of handlers in recognition of the differences between the standard milk for which the price is quoted and the actual milk being priced.

3. The third step is the determination of a blend price to producers for market milk of a specified standard. Again the standard stipulates a butterfat content, delivery place and perhaps quality.

4. The fourth step is the determination of variations in prices to producers made in recognition of differences between the standard for which the blend price is quoted and the actual milk delivered from each dairy farm. My descriptions make these four steps rather long. A short step description would be, (1) determination of quoted class prices, (2) determination of variations from quoted prices to apply to milk as it is utilized by handlers, (3) determination of quoted blend price to producers and (4) determination of variations from quoted blend price to be used in paying individual farmers for milk.

I shall try to summarize the pricing process according to these four steps indicating the uses made of fat and solids-not-fat. This summary will be limited to the steps involved in pricing Class I or fluid milk and in determining producer prices, since the pricing of market milk for manufacturing purposes already has been discussed by the previous speakers.

Determining Quoted Class I Prices

In general, three methods are used in determining quoted Class I prices for a particular standard of milk. These are:

1. *Pricing based on manufacturing values*—starting with a competitive value of milk for manufacturing purposes, add a fixed premium judged to be of sufficient size to establish a total price that will attract the quantity of milk the market requires to service adequately its Class I needs. Commonly, the competitive value of milk for manufacturing purposes is arrived at by adding a value for fat used in the manufacture of butter to a value for skim used in the manufacture of nonfat dry milk.

Thus, one of the three commonly used methods for arriving at quoted Class I prices places emphasis on fat in proportion to its alternative use value in butter, on nonfat solids in proportion to its alternative use value in nonfat dry milk and on a premium judged necessary to cause sufficient quantities of milk to be delivered to market.

2. *Pricing based on economic indicators*—Start with a price which existed in some base period and adjust this price in line with changes in indicators of economic conditions. Economic indicators used include feed prices, consumer incomes, condensery prices, wages of farm labor, wholesale prices in the United States and the proportion of the supply of milk used in surplus or Class I. Presumably, the base price with which this process starts was such as to balance production and consumption of milk in the area and presumably, the economic indicators used as movers to adjust the price are such as to make reasonable use of price to maintain a long run balance.

Thus, a second method commonly used for arriving at quoted Class I prices places emphasis on an adequate supply of whole milk. Use is not made of fat nor of solids-not-fat in determining the quoted price.

3. *Pricing based on public hearing evidence*—At public hearings evidence is received as to what the price should be and following the hearing a price is established at a fixed level until changed following another hearing held for that purpose. Evidence considered at the hearing may emphasize cost of production but includes many of the same economic indicators used in price formulas. Some consideration may be given to balancing supplies and sales.

Thus, a third method gives consideration to whole milk rather than to its constituent parts. In determining a price for a standard of whole milk, of course, certain characteristics of the milk are stipulated. A percentage of fat is stipulated by the standard just as location, time and quality. Likewise a normal relationship of solids-not-fat to fat is implied, a minimum content of solids is required by law and adulteration is prohibited.

Pricing different units of Class I milk

The second step in pricing Class I or fluid milk, is the determination of how much to charge handlers for milk because it differs from the standard to which the quoted Class I price applies. Present practice commonly provides for differential charges based on variations in butterfat content and place of delivery. In some markets differentials are established in an attempt to recognize variations in quality.

Any large market, where part of the milk supply is received through country plants, provides an example of Class I charges which vary with

place of delivery. Pricing in the Philadelphia market serves as one example of variations in Class I charges to handlers in recognizing deviations from a standard quality. The Class I price is quoted for grade B milk. Extra charges are made for grade A milk in accordance with bacteria counts. A butterfat differential two cents greater than the regular butterfat differential is paid for fat in grade A milk in excess of 3.7 percent.

In all markets where prices are established by government orders, variable charges are made of handlers for Class I milk in accordance with the butterfat content of milk. Butterfat differentials may (1) be based on an alternative use value as is done in the New England markets, (2) be arrived at arbitrarily as has been done in many markets in the mid-Atlantic states, (3) or be determined by dividing the total Class I price between fat and skim in proportion to manufacturing values as is done in many midwestern markets.

One interpretation of the Class I butterfat differential is to consider that its effect is to divide the quoted Class I price between a butterfat value and a value applicable to the remainder of the milk. The charges to handlers for butterfat vary with the pounds of fat consumed in Class I products but the residual charges vary with pounds of skim milk and not with pounds of nonfat solids.

With standardization permitted and the Class I price divided between fat on a per pound basis and skim on a per hundredweight basis regardless of pounds of solids, two handlers pay equal charges for products which may contain different amounts of solids-not-fat providing they do contain equal amounts of fat. On the other hand, the charges to handlers are differentiated if products contain unequal amounts of fat, even though they may contain equal amounts of nonfat solids.

Where standardization is not permitted and where the amount of the butterfat differential is determined other than as equal to an alternative use value, it can be argued that the butterfat differential is in payment for both variations in butterfat and accompanying variations in solids-not-fat. Stewart Johnson[3] made this argument when he called the butterfat price differential a misnomer in some respects because the "differential is paid in part because of an accompanying change in the solids-not-fat in milk." Although under certain circumstances, the effect may be the same as though a separate differential for solids-not-fat were used, the butterfat differential certainly was not designed with that thought in mind.

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[3] Remarks at the 86th Annual meeting of Americal Jersey Cattle Club, June, 1, 1954, Springfield, Mass.

Even though the use of a Class I butterfat differential may result in dividing the Class I price between pounds of fat and volume of skim, it is not logical to argue that fat is the only constitutent factor considered in pricing Class I milk. With Class I butterfat differentials in some markets as low as 4 and 5 cents and fixed at those levels regardless of the quoted Class I price, the price of something other than butterfat may constitute as much as two-thirds of the total price. Only when the butterfat differential is in direct ratio to the Class I price can it be said that butterfat is the only factor considered. Markets where a direct ratio Class I butterfat differential is used, are exceedingly few in number and small in size.

On the other hand, a statement that differential charges for Class I milk are not made to compensate for variations in solids-not-fat does appear to reasonably describe the facts. Standardization permits fat variations which are not accompanied by variations in solids-not-fat. Butterfat differentials based on the value of fat in an alternative use do not imply any consideration of a value for solids-not-fat. Even the fixed differentials in markets where standardization is not permitted probably were not designed to reflect any value for accompaning changes in solids-not-fat.

Determining Producer Prices

Producers receive a blend of charges made of handlers for the different classes of milk. This blend or average producer price results from dividing the total proceeds from sales to dealers by the total volume of milk delivered by producers. The total proceeds from sales to dealers includes the plus and minus amounts resulting from differentials used in charging dealers. Before the blend price is calculated sums adequate to pay differentials to producers are set aside from the total pool money.

In determining charges of dealers, some consideration may have been given to fat and solids-not-fat as already discussed. However, in the process of determining the quoted blend price to producers, no additional consideration is given to either fat or nonfat. The calculated blend price is paid for whole milk of a stipulated standard.

The milk delivered by a large majority of the farmers differs in one or more respects from the standard to which the quoted blend price applies. In recognition of these differences, adjustments are made in determining prices to individual farmers. Such adjustments commonly are made for butterfat and for delivery point and perhaps for quality differences. To the best of my knowledge, producer prices are not adjusted for variations in solids-not-fat in any market.

The usual methods for establishing producer butterfat differentials include (1) a differential approximately equal to the value of fat in an

alternative use such as butter or cream, (2) a differential equal to an average of differentials used in charging handlers for butterfat, (3) a differential equal to the Class I butterfat differential used in charging handlers for fat used in Class I.

It can be argued that since producers do not standardize milk before making deliveries to handlers and since in normal milk some relationship between fat and nonfat does exist, the butterfat differential is in reality a payment both for fat and an accompanying variation in solids-not-fat. Certainly, there is room for argument concerning this point. If the producers' butterfat differential is an average of fat differentials paid by handlers, or if it is based on an alternative use for fat, then apparently it is not intended to be a payment in part for solids-not-fat. In fact, present producer butterfat differentials can be considered as being in part a payment for variable amounts of solids-not-fat only because no other payment actually is made for this purpose.

Modifying Pricing System to Emphasize Nonfat

The first step in pricing is the determination of a Class I price to apply to a standard milk. In doing this, a proper objective appears to be to arrive at a price which when blended with the proceeds from the sale of surplus milk will give a producer price which will come as close as possible to balancing supplies with use. With this objective in mind, there may be no need in many markets for giving consideration to the constituents of milk. In other markets where the competition for a supply is with manufacturing milk, the value of the constituents for manufacturing presumably dictates changes in quoted Class I price for market milk.

The second step in pricing is to divide the Class I price among the different properties of market milk that give it value for fluid use. The obvious constituents of market milk are (1) fat, (2) solids-not-fat and (3) water. When these three items are separated from each other the water has no value, in fact if the constituents are to be separated, water has a negative value since a cost is encountered in getting rid of it. However, market milk is a combination of water, fat and solids-not-fat. There is no evidence that the value of the combination is exactly equal to the sum of the values of its parts. Nor is it clear that even in manufacturing areas, that the values of fat and nonfat in manufacturing milk determine any exact limits on prices which should be paid for fat and solids-not-fat in market milk.

Market milk has properties or characteristics other than its separate constituents which give it value to a handler for Class I use. These characteristics include at least the following:

1. Produced and handled in such a way as to meet minimum requirements of health departments.
2. Continuous availability for use as fluid milk.
3. Free from undesirable odors and flavors.
4. Available in sufficient volume from each producer and in each locality to permit efficient marketing.
5. Produced in reasonably uniform amounts from season to season.

If these characteristics or properties of market milk plus perhaps other miscellaneous features are grouped under one heading and designated as "market milk qualities," a handler in purchasing milk for fluid use can be considered to be paying for (1) fat, (2) solids-not-fat and (3) market milk qualities. Then, the Class I price properly can be divided and the parts assigned to these three properties.

The properties grouped under the term, market milk qualities, are associated with the volume of whole milk; that is, the values of these characteristics do not vary with variations in the proportion of solid constituents in milk. If so, the price assigned to market milk qualities could remain the same for each hundredweight of milk except for location and special quality characteristics.

Other properties, fat and solids-not-fat, vary within each hundredweight. Thus, the prices assigned to these properties could vary with the amounts of solids present. Differences within each volume unit of milk would give rise to differentials for fat and for solids-not-fat. Such a system of pricing would set aside a part of the Class I price which would remain constant for each hundredweight of milk and other parts which would vary with amounts of constituents present.

Although my enumeration of the properties of market milk which make it valuable for fluid use, may be at best only illustrative, such an enumeration probably is easier than determining the amounts of the Class I price which should be assigned to each.

There are at least two ways by which the values of the two types of solids might be based on prices of fat and nonfat products, probably with many variations of each. Values could be determined on a principle of alternative use which involves the substraction of manufacturing allowances from quoted prices for such products as butter and nonfat dry milk. A second method would be to determine values using a principle of alternative source of constituents which would involve adding a premium for quality and an allowance for reconstitution.

Determining prices on an alternative source basis as compared with an alternative use basis would increase the prices of the solid constituents and decrease the proportion of the price assigned to market milk qualities. This would result from the elimination of allowances from the

calculation. It also would increase the price of solids-not-fat relative to the price of fat. The making allowance on nonfat dry milk is, of course, a larger proportion of the wholesale price than the making allowance on butter.

Differential charges for Class I use of solids-not-fat would need to be calculated separately since fat standardization of whole milk is permitted in many markets and since low fat Class I products are made, rather than being purchased as such from farmers.[4]

In adjusting blend prices to producers, values of milk from individual shippers probably should be based on differentials charge handlers. Thus, if handlers are charged differential values for fat and solids-not-fat, a blend of the class differentials could be used in paying producers. However, there may be arguments for paying producers the Class I differentials charged handlers, and there may be arguments for paying producers a solids-not-fat differential even though no differential charge is made of dealers. An argument for the latter might be that the handler selects the high solids milk for fluid use. In the absence of an efficient test for solids-not-fat, the butterfat and solids-not-fat differentials to producers might be combined into one differential as has been suggested by Froker and Hardin.[5]

Reasons for Limited Emphasis on Solids-Not-Fat in Pricing Market Milk

For at least two reasons, little attention in pricing market milk has been given to variations in solids-not-fat content of milk. First, the market value of variations in solids-not-fat in fluid milk is uncertain at best and when measured by alternative use, apparently slight. A second reason is the lack of a simple, inexpensive and reliable method for determining the amounts of solids-not-fat in different units of milk.

Since the greater share of the nutritive values of milk is in the solids-not-fat, the argument is advanced that this fraction of the milk should be assigned the major part of its price. It is argued that protein in milk has a comparable value in human nutrition to protein in other animal foods and should be priced accordingly. This type of argument concerns potential market values of solids-not-fat in fluid milk but ignores the uncertain knowledge of present market values.

In a bottle of fluid milk, variations in solids-not-fat have little meaning to consumers. Most consumers would be unable to recognize small variations by taste and they have not been educated to consider differences

[4] Norris Pritchard gave consideration to fat standarization in a recent report *An Improved Method of Pricing Fat and Non-fat-Solids in Milk*, Agr. Mktg. Ser., U.S.D.A., July, 1954.

[5] R. K. Froker, and C. M. Hardin, *Paying Producers for Fat and Solids-Not-Fat in Milk*, Wisc. Agr. Exp. Sta. Research Bulletin 143, February, 1942.

described to them. Although there are indications that handlers prefer to market a high solids milk, particularly if the fat content is low, it is not clear that handlers are willing to or can afford to pay much for additional solids in Class I milk.

As a separate product, fat has much more value per pound than solids-not-fat. For example, a pound of fat in butter is worth between 60 and 70 cents while a pound of solids-not-fat in the form of nonfat dry milk is worth only about a fifth of that amount. If these alternative product values are used to price variations in the butterfat and solids-not-fat contents of milk the fat value difference between 3.5 and 4 percent milk is worth between 30 and 35 cents and the accompanying average difference in solids-not-fat is worth less than 3 cents.

Thus, the value of variations in the solids-not-fat content of fluid milk is uncertain and the value of solids-not-fat in an alternative use is low. It can be presumed that to date this situation has been a factor in the failure to give specific consideration to solids-not-fat in the pricing of market milk.

Since an efficient test for solids-not-fat is not available, reliance would have to be placed on an average relationship between fat and solids-not-fat in order to use a nonfat differential in pricing market milk.

Several different average relationships have been observed by investigators. Probably the most widely known and frequently quoted relationship of fat to solids-not-fat is the one described by Jacobson.[7] In an analysis of 150,000 samples of milk delivered by New England farmers to processing plants over a period of more than a year, he determined that each point (.1 per cent) variation in fat was accompanied by .4 point variation in solids-not-fat.

Jack, Roessler, Abbott and Irwin[8] of California have published results of a study of the relationship of fat to solids-not-fat in milk. In this study, a total of 20,694 samples of milk obtained from all areas of the state of California over a period of approximately two years were analyzed. The Babcock test was used to determine the fat content; the total solids were determined gravimetrically; and the solids-not-fat were determined by subtraction. The California investigators observed that each point variation in fat was accompanied by an average variation in solids-not-fat of .444.

Overman, Sanmann and Wright[9] at the University of Illinois calculated

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[7] M. S. Jacobson, "Butterfat and Total Solids in New England Farmers' Milk as Delivered to Processing Plants," *Journal Dairy Science*, Vol. 19, pp. 171-76, 1936.

[8] E. L. Jack, F. H. Abbott, E. E. Roessler, A. W. Irwin, *Relationship of Solids-Not-Fat in California Milk*. California Agricultural Experiment Station Bulletin 726, 1951.

[9] O. R. Overman, F. P. Sanmann, and K. E. Wright, *Studies of the Composition of Milk*. Illinois Agricultural Experiment Station Bulletin 325, 1929.

equations for estimating solids-not-fat from the fat content of milk. The relationship determined by the Illinois investigators in analyses of 2,426 samples of milk was that for each point variation in the fat a corresponding variation of .3846 point occurred in the solids-not-fat.

Each of the three quoted ratios assume a linear relationship between fat and solids-not-fat. Richardson and Folger[10] have concluded that the relationship between fat and solids-not-fat differs at various levels. Thus, within a fat range of from 2.75 to 3.30 percent, Richardson and Folger's relationship is .3151 point variation in solids-not-fat for each point variation in fat. Likewise, within a range of 3.30 percent to 4.25 percent; 4.25 percent to 5.85 percent; and 5.90 percent to 6.75 percent this relationship is .70 point .3846 point, and .2457 point, respectively.

The solids-not-fat contents as estimated by these equations are not the same at any given fat test. For instance, at a fat test of 3.5 percent the Jacobson equation yields a solids-not-fat percentage of 8.47 while the equations of Jack, Overman, and Richardson yield solids-not-fat percentages at this test of 9.020, 8.622 and 8.550 respectively.

Several investigators have observed the relationship between fat and solids-not-fat in breed milks. The regression equations developed by the investigators for estimating solids-not-fat in breed milks vary as among breeds and the results observed by the several investigators differ for the same breed. Further, the evidence indicates that the solids-not-fat content of milk varies as between the milk of two cows or two herds of the same breed having identical fat tests.

Thus, methods for determining accurately the solids-not-fat content of milk are presently inadequate. It can be presumed that this situation has been a factor in delaying the development of a differential to recognize variations in the solids-not-fat content of market milk. The inaccuracies of the estimates based on observed average relationships would be unimportant as long as solids-not-fat were priced at a low value. However, if priced at such a low value as to make the inaccuracies unimportant, any differential to recognize variations in solids-not-fat also is unimportant.

Summary

Statements which imply that market milk currently is priced on a butterfat basis show a lack of comprehension of the pricing process. In each market a quoted Class I price is determined for milk of a stated standard. In this process in many markets, consideration is not given to the constituents of milk. In other markets the quoted price of standard

[10] G. A. Richardson, and A. H. Folger, "Compositional Quality of Milk—I." "The Relationship of the Solids-Not-Fat and Fat Percentages." *Journal of Dairy Science*, Vol. 33, March, 1950, No. 3.

Class I milk is arrived at by aiding a premium to the value of milk for manufacturing. In these latter markets consideration is given to both fat and solids-not-fat and in proportion to their values for alternative manufacturing uses.

Having determined a Class I price for a standard, the next step is to differentiate the price between units of milk as the milk varies from the standard. Butterfat is one factor considered in this process. Consideration is not given to variations in solids-not-fat in differentiating between different units of Class I milk.

Market milk has certain properties which make it valuable for fluid use. These include its constitutents, fat and solids-not-fat and other properties which might be included under such a designation as market milk qualities. Only the properties, fat and solids-not-fat vary as between two volume units of milk. In dividing the price of Class I milk among the several properties of milk, one part should be assigned to market milk qualities and should be the same for each volume unit. Prices assigned to fat and solids-not-fat should vary from one unit to another as the amounts of fat and nonfat solids differs.

Proposals have been made to use solids-not-fat as a factor in adjusting prices among farmers as their milk differs from a standard. There are at least two reasons why to date this has not been done. First, an efficient test for solids-not-fat has not been perfected and the observed average ratios between fat and solids-not-fat are sufficiently in conflict as to raise questions concerning their suitability for use in paying individual farmers for milk. Secondly, the market value of variations in solids-not-fat in fluid milk is uncertain and the value of solids-not-fat as a separate product is relatively low as compared with butterfat.

It is important, however, that consideration continue to be given to possible price adjustments to recognized variations in the solids-not-fat content of milk. Merchandising efforts to translate nutritive values into market place values should be pursued. It would be unfortunate if the decline in butterfat values should result in pricing arrangements which would direct farmers to produce milk with a lower solids-not-fat content.

DISCUSSION

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One is tempted to summarize Professor Pierce's paper by observing that the practical importance of solids-not-fat in milk seems to consist almost entirely of its theoretical importance. The marketing difficulties of the butter industry have greatly overshadowed those of the dry milk industry. As a result, few economists or dairy industry people readily recognize that relative values of

fat and solids-not-fat, as measured by butter and dried skim milk, are about the same today as they have been for most of the past 30 years. Alternative-use values of solids-not-fat, not only are small relative to those of fat as Pierce points out, but they have not in fact shown an appreciable relative increase. Hence, if one is to argue for a change in the basis of pricing at present, it must be mainly for the sake of logical nicety, and not on the expectation of a general readjustment of values.

Most of the proposals for recognizing the value of solids-not-fat in milk have depended on the correlation between the percentages of fat and solids-not-fat. These proposals would increase the butterfat differential by the value of the associated solids-not-fat. It is paradoxical that a movement to deemphasize the value of fat should end up by increasing butterfat differentials.

Professor Pierce did not phrase his presentation explicitly in terms of supply and demand equilibria in fluid milk markets, but he mentioned a few examples in which consumer demand, or the derived demands of distributors, is shown to be quite insensitive with respect to solids-not-fat. In theory, as Pritchard points out in the Marketing Research Report to which Pierce refers, a plan for adjusting market milk prices for differences in composition should achieve approximate equality between the average composition of all milk received and that of all fluid products sold. Yet it appears that both supply and demand with respect to solids-not-fat are so unresponsive to price as to tolerate sizable pricing "errors" for relatively long periods. There is evidence on this point, in addition to some of Pierce's observations.

(1) There have been times when producers having milk high in butterfat were actively sought by milk dealers, smaller ones particularly. But no examples of such a search for solids-not-fat have come to my attention, and I doubt if any have ever occurred.

(2) The opportunity of altering the percentage of solids-not-fat in milk, or its ratio to fat, by natural selection is limited. Standard errors of estimate of solids-not-fat from fat range mostly from .3 to .4 percent. The outside difference between any sizable quantity of milk naturally high in solids-not-fat and a market average, thus, is probably no more than one-half percent, the fat percentage being held constant. Fortification with dried or condensed skim milk affords a much wider opportunity to influence the composition of finished product, and it has been used only to a very limited extent.

(3) Many Southern markets have more-or-less chronic surpluses of fat owing to the high test of milk from producers, and the high consumption of cultured buttermilk. But this has not seemed to lead to any notable disequilibrium among milk distributors, nor to unusual efforts to establish a balance of fat and skim milk.

(4) On the supply side, the response to price also appears to be small. James Miles reports that milk was priced on a flat price basis in South Carolina up until 1949 or 1950, yet the average butterfat content of 4.45 percent was slightly higher than the 4.4 percent of 30 years earlier. Against this must be cited some instances of long-run responses: Provan reported a decline in fat and solids-not-fat in Great Britain during 20 years under a flat price plan. In a part of the Netherlands where direct ratio pricing has prevailed, there was an increase in fat and solids-not-fat during a similar period. The absolute changes were only about .5 percent of fat and .3 percent solids-not-fat; not large relative to, say, differences among breeds.

A pointed discussion of this relative insensitivity of demand and supply responses might well have constituted a fourth section of Pierce's paper. The space could have been gained by some condensation of the discussion of present pricing methods.

Another line of inquiry that might have been developed concerns the equating of marginal revenues in differentiated markets for the components of milk, rather than for milk as a homogeneous product.

Pierce's suggestion that fat and non-fat components of milk be priced on an alternative source basis, rather than alternative use, is a novel one, and related to the conditions of supply and demand equilibrium. It would seem to apply most appropriately in markets which normally supplement their locally-produced milk with fat and solids-not-fat in cream, condensed milk, etc., from outside sources, and even there it might have a seasonal application. It would probably not tend to establish equilibrium on the demand side in markets where significant quantities of milk must regularly be processed into the alternative use products.

Pierce emphasizes the case where standardization is permitted or practiced as a factor in the suitability of the butterfat differential as a vehicle for solids-not-fat payments. In the case of Class I pricing, he makes only casual reference to the inclusion of low fat products. It should be pointed out that in many Federal Order markets, both cream and low fat or skim milk products are include in Class I. Fat and solids-not-fat vary inversely in such utilization, and charges to handlers for solids-not-fat could not be based on the fat, even though standardization of whole milk were prohibited.

Stewart Johnson calculates that the additional solids-not-fat accompanying an additional pound of fat in milk has a net value after manufacturing costs of only one twenty-fifth that of the fat. This deemphasizes the solids-not-fat too greatly. The marginal cost of processing high test milk is considerably below the average cost. Consequently, the additional solids-not-fat can be valued close to the full wholesale price, and the ratio would be more like one-tenth. Furthermore, there is a range of solids-not-fat percentages accompanying a given fat percentage. Payments to two producers whose milk was of the same fat percentage at present values of dried skim milk could differ 7 to 8 cents or more per hundredweight in one out of three comparisons.

Tests for solids-not-fat are alleged to be inadequate. It is true that it costs more to find the percentage of solids-not-fat by the Mojonnier method than to find the percentage of fat by the Babcock method. But lactometry is cheaper than the Babcock test. There are discrepancies between the solids-not-fat by lactometry and by the Mojonnier method, but Sharp thinks the error lies as much in one as in the other. We need to know more about the day-to-day variations in solids-not-fat before we can specify adequate sampling routines, but I believe that lactometry will prove to be sufficiently accurate and economical to be used as a basis for paying for solids-not-fat should producers or dealers become sufficiently concerned.

Finally, the recommendation to pursue merchandising efforts to translate nutritive values into market place values is to be strongly endorsed. Until this translation is accomplished all pleas for placing more of the value of milk on its solids-not-fat will rest on mere wishful thinking.

LOW INCOME AREAS IN AGRICULTURE

Chairman: Bushrod W. Allin, Agricultural Marketing Service

SIZE AND DISTRIBUTION OF THE INCOME OF FARM PEOPLE IN RELATION TO THE LOW INCOME PROBLEM*

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AGRICULTURAL economists have sometimes been known to "get their facts first" and then to take up the problems of their uses, definitions, and meaning. I would prefer to follow that order in the development of the topic assigned to me here, but I shall avoid the temptation to do so because of the large dangers inherent in such an approach. Such dangers have been treated at considerable length in recent literature on personal income distribution. Indeed, some competent scholars have cautioned that many of the income-size distribution statistics in circulation are subject to large misinterpretation and are in fact dangerous.[1]

One reason for danger in some cases is that such statistics are unreliable estimates of what their authors purport them to be because of the small sample on which they are based and/or because of errors of enumeration, reporting and tabulation. But the larger danger and the larger part of the controversy generally evoked by the presentation of income distribution data do not have their sources in the statistics as such. Rather they grow out of the uses that are attempted of them or evolve about the social philosophy those uses imply.

To some extent this danger can be minimized, I believe, by recognition of and careful attention to the interrelationships between the purpose for which income facts are to be used, the definitions or theory relevant to that use, and the nature of the facts produced. This follows from the fact that the use to be made of income statistics determines what definition is relevant and what adjustments need to be made in the valuation of various income components. In this way it determines the nature of what for that use are *the income facts.*[2] In practice, however, we often are able to use, instead of income statistics conforming to our concepts, only the income statistics obtainable or available. This increases the need to recog-

* This paper has been developed as a phase of the writer's research on the problems of low productivity in American agriculture under a grant at the University of Chicago by the Rockefeller Foundation.

[1] Margaret G. Reid, "Changing Income Patterns," *American Income and Its Uses* (New York: Harper and Brothers, 1954); Dorothy S. Brady, "Research on the Size Distribution of Income," *Studies in Income and Wealth,* Volume 13 (New York: National Bureau of Economic Research, Inc., 1951).

[2] Brady, *op. cit.*

size their limitations and to adjust our uses and interpretation of them accordingly.

Hence in this paper I shall first treat of the significance and uses of income data in conjunction with low income and poverty problems and the requirements of these uses with respect to definition and precision of income measurements. Then I shall attempt in a very summarily fashion to delineate the major low income areas and low income population groups in American agriculture.

Uses of the Personal Income Concept and of Its Empirical Counterpart

Concern about the relatively low income of farm people both in local areas and in the nation as a whole has been a major factor in the origin and development of agricultural economics as a distinct field of study. It has also been important in the shaping of most of our public agricultural policies and programs. It would seem therefore that one could readily obtain a list of the uses of personal income statistics in conjunction with low income problems by a hurried reference to a random selection of agricultural economic papers and bulletins. Yet strange to say, the concept of personal income has been used very little in our field. Instead, judged by the literature, agricultural economists have taken with few exceptions the position best summarized in the words of one of our nation's leading contributors to economic thought:

> The science of distribution [and of production and of economics generally in Professor Clark's formulation] should tell us primarily, not what any man personally gets as a total income and how well off he is compared with other men, but in what way the wages of his labor, the interest on his capital and the return for the entrepreneur's function are fixed.[3]

Hence low personal incomes as such have had for us little significance as economic problems except where they could be demonstrated to be the result of underemployment or of inefficiency in the use of resources. Expressed in another way, they have commonly been regarded by agricultural economists to be only a production problem such as can be analyzed and evaluated in terms of the principle applicable to simple enterprise problems.

Agricultural economists, therefore, have seldom conducted research oriented specifically to low production and incomes as economic problems, or as the subject of their inquiries. Rather they have touched upon low income conditions in only a very indirect fashion, usually in a fashion that has been inadequate to an understanding of their causes and inadequate for an evaluation of their possible remedies. In the last few years,

[3] John Bates Clark, *Essentials of Economic Theory* (New York: Macmillan Co., 1907), pp. 89-90.

however, some students have taken low income farms or low income areas as phenomena to be explained. Using the basic concepts of competitive economic theory they have attempted to ascertain whether the low incomes result from inefficiencies or underemployment in the use of resources or from more deeply rooted causes. A worthy example of such effort is that by C. E. Bishop on the underemployment of labor in southeastern agriculture.[4] In this, he did not conclusively identify underemployment in the region, yet he contributed to a much better understanding of alternative employment opportunities.

Part of his difficulty in identifying underemployment can be attributed to the fact that he had available only average incomes for the region as a whole and that these were for only the income from agriculture. The larger difficulty lay in other requirements of the measure of income needed to identify underemployment defined in a fashion that is meaningful in a democratic society. These are well expressed in Bishop's words: "Only when differences in returns for labor services represent differences in real net income can we identify imperfect mobility in the labor market." But "*the relevant real income data must be expressed in levels of satisfaction,*" or utility, "*rather than in terms of a particular bundle of goods and services.*"[5]

Most of us would agree with him on this requirement. But it presents a very difficult if not an insoluble problem. For holding rigorously to equilibrium theory, satisfaction or utility is immeasurably indirectly through the measuring rod of money except in the absence of the very imperfections whose existence are in question. In practice, therefore, the best that can be done is to analyze employment possibilities as they relate to the elements of income that can be measured in a reasonably objective fashion, recognizing as Marshall did that most people are interested in this part of income but that it is not the whole of human interests.[6] In doing this, we can provide people a better informational basis on which to make their decisions even if we cannot tell them what alternative is best, and have for our judgment a higher degree of scientific validity than is possessed by a different judgment of their own.

If in our studies we shift our emphasis from attempting to determine the best employment opportunity, or what ought to be done, to attempting to better understand what various alternatives involve in terms of those values or interests that can be related to money, then we can perhaps eliminate some difficulties with respect to the definition and measure-

[4] C. E. Bishop, "Underemployment of Labor in Southeastern Agriculture," *This Journal*, May, 1954.

[5] *Ibid.*, p. 260.

[6] Alfred Marshall, *Principles of Economics*, Chapter II, Book I.

ments of income for use in analyzing the employment aspects of low income problems. For once the difficulty of identifying the one most efficient or best use of resources is admitted, then the major claim that can be made for one measure of income over another for the purpose of evaluating employment alternatives is that it takes account of more of the elements considered important to changes in residence and employment. Among these elements are opportunities for the production of home use goods and services. For the purposes of considering employment alternatives, how these are valued—whether at farm prices or city retail prices—is less important than that they be recognized as an element of income; that the method of their valuation be made explicit; and that this method be one which the relevant decision making units themselves can understand and use in making their own employment decisions. Indeed, a comparison of only net money incomes as between different kinds of employment, or resource use combinations, may help farm people to make better evaluations of their employment alternatives. Many are making their evaluations without even this much knowledge of alternatives, for the failure of families to move out of agriculture or to change their methods of farming implies also an evaluation even when this is made in all but total ignorance of their alternatives. This same general principle also holds with respect to public policy alternatives relating to low income problems.

We should of course have income estimates that are reasonably accurate with respect to the income elements they purport to cover and to the prices and wages they are purported to represent. But income considerations alone are generally much less than the totality of considerations entering into an intelligent evaluation of employment alternatives. Recognition of this point should condition somewhat our demands for highly precise estimates of those components of income that can be measured.

Low personal incomes when not associated with identifiable inefficiencies in the use of resources may still have large significance as welfare problems amenable to changes in income and wealth distribution. As a logical extreme, one could hold that any inequality in income distribution is socially undesirable without reference to its causes and to the consequences for aggregate production and income of corrective measures. Few, if any, have ever taken this extreme position, but for such people, if there were any, statistics on the size and distribution of income would be the full statement of an income problem and of the policies and programs needed for its solution. A major conceptual difficulty of this position of course is that of defining what equality of income distribution means when applied in a society composed of people who are not equals in their abilities, wants, and needs.

Some students of income distribution problems, however, apparently believe that to warrant policies and programs on welfare grounds there is a need to resolve this conceptual difficulty—i.e., that of how to divide income equally among people for whom the meaning or value of income is not equal and for whom the degree of inequality of meaning cannot be measured. At least this is an inference one might draw from some criticisms of income distribution data made on the grounds that they do not take account of differences in ability, wants, needs, geographic location, size of neighbors' incomes, and other factors affecting one's valuation of income. There seems to be a presumption behind these criticisms that unless these difficulties are resolved and corresponding adjustments are made in the valuation of income, then we have no conclusive evidence on the extent of inequality in income distribution or possibly no conclusive evidence that it occurs when account is taken of all relevant factors.

It is well that we concern ourselves with the failure of our facts to meet the requirements of our concepts. But the fault here may lie in our concepts. It may be that we are striving for an empirical counterpart of a conception of income that embraces the whole meaning of life and which can therefore be used as a sufficient basis for the evaluation of all social and economic conditions. In other words, it may be that we are looking for income distribution statistics that will themselves tell us what ought to be done, or that have within themselves the fullness of their own meaning.

Obviously we now have no such income statistics. Thus, we have broadly speaking two alternatives: (1) we can shut our eyes to all income distribution data and facts so that we need not make value judgments about income distribution patterns and about social and economic conditions. Or (2) we can walk with what vision and intelligence we have. In this latter, we can use income statistics now available recognizing (a) that possibly little of their meaning is to be found wholly within those statistics themselves; and (b) that the larger part of their meaning is something that has yet to be developed—out of statistics on incomes produced at some other time in history and/or out of statistics on incomes that are yet literally to be produced. Indeed, the meaning of our present income patterns is something that in all likelihood will continually be enlarged and altered as long as the conditions they represent concern us at all. If this is so, then there is no such thing as a full determination of their social and economic meaning in any cross sectional view, no matter how detailed and how well stratified by areas, population groups and resource combinations the income data are. There is, of course, much that can be learned by such cross sectional views. But there is a danger that a purely

cross sectional view, examined within a static analytical framework, will reveal very little compared with the meaning of such statistics when viewed in a time perspective, or more particularly when viewed in the light of action and experience of kinds postulated as solutions of the low income problem.

If we can accept this developmental character of the meaning of income statistics, then I believe that we can find meaning in them far transcending that embraced in the concepts of *efficiency* in resource use (as we are wont to use this term) and *welfare* as a problem in the distribution of income. This meaning is that relating to activities for which the key questions are not what is the most efficient use of resources and the best distribution of income but such questions as (1) What are resources? (2) How are resources created and increased? (3) How are markets for the products of new resources developed? And (4) how do resources acquire the attributes of property and ownership so that their income yield becomes the income of low income people instead of the income of somebody else? When we take our bearings from economic history instead of from only what we can see within a static framework of analysis, it seems to me that here are the truly key questions to an explanation of our own and of the world's major income differences, and in turn to the meaning of those differences for us as social and economic problems.

In other words, it is my thesis that low incomes are neither in any large measure a result of inefficiency in the use of resources nor a problem amenable in any but a very limited measure to changes in the distribution of income. They are rather a result of low income people's and low income communities' paucity of resources. Under this heading, I would include not only land and other physical things but als[illegible] and technology, which are components of physical things as capital in its value sense.

Major Low Income Areas in American Agriculture

The major income facts with whose meaning we are concerned are those relating to the occurrence of low incomes in American agriculture. The average money income of farm operator families in the United States in 1949 has been estimated at $2,650.[7] The average value of the other elements of their income measurable in market terms varies depending upon how those elements are valued. In 1946, they were estimated to have had a value of $514,[8] and by the same methods of valuation were probably not more than $750 in 1949. Looking at American agriculture

[7] E. W. Grove, "Income of Farm-Operator Families in 1949," *Farms and Farm People* (Washington: Government Printing Office, 1953).

[8] *Income Distribution in the United States*, A supplement to the Survey of Current Business, Office of Business Economics, U. S. Department of Commerce, 1953.

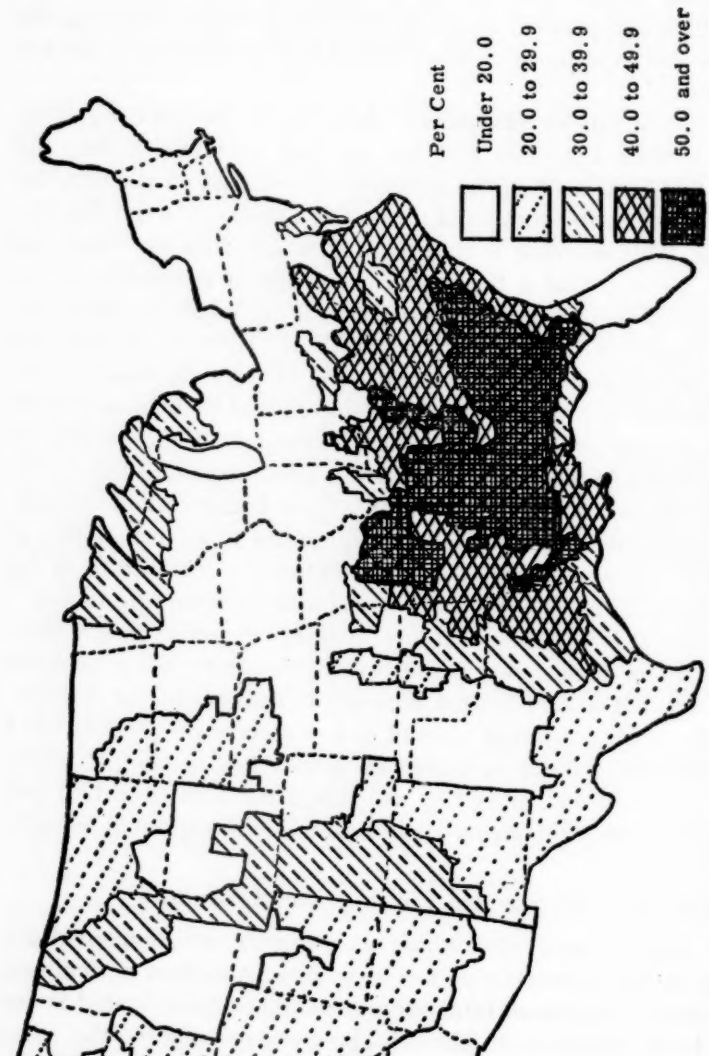

FIGURE 1. PERCENT OF RURAL FARM FAMILIES REPORTING NET MONEY INCOME OF LESS THAN $1,000, ECONOMIC SUBREGIONS, UNITED STATES, 1949.

Source: *Vol. III, Farm Housing Characteristics, United States and Economic Subregions, Census of Housing: 1950.*

as a whole and adjusting for differences in the purchasing power of money, size of income receiving units, and several other factors, Margaret Reid's studies reveal an average purchasing power to nonfarm consuming units in 1949 that was only 15 percent higher than that to farm consuming units. When these are standardized by states, farm and nonfarm units were found to have roughly the same disposable income measured in terms of equivalent purchasing power.[9]

Against this imposing record of achievements by farm people, however, there were 1,366,000 farm operator families who according to the Bureau of the Census reported receiving a money income of less than $1,000 in 1949.[10] There were 485,000 additional farm operator families who did not report the receipt of net income. Of these, 305,000 were the operators of "low production farms."[11] Hence, in all probability, the total number of farm operator families having money incomes of less than $1,000, as measured in the Census Bureau's enumeration, was in excess of 1.5 million out of a total of 5,341,000 farm operator families in the United States as a whole.

These money incomes were probably under-reported for the United States as a whole by about 20 percent.[12] The amount of under-reporting as a percent of their full income may have been larger among low-income than among higher income families but there is no reason to suspect that the number of dollars by which the former under-reported was any larger than among higher income families. Too, the value of income in kind as a percentage of their total income was probably larger on farms with low money incomes than on others. The value in dollar terms, however, was probably no higher on low income than on high income farms. Hence the making of adjustments both for under-reporting of money income and for income in kind would probably not significantly alter the ordering of families on the income scale, although it would lessen the degree of inequality as expressed by the Lorentz curve.

In terms of location, approximately one million of the farm operator families with money income under $1,000 (without adjustments for under-reporting) live in the South. They make up 50 percent or more of all farm families in a large part of the Southern region (Figure 1). They account for 40 percent or more of farm operator families in most of the rest of the Southern region, with the exception of the peninsula area of Florida, the western two-thirds of Texas and Oklahoma, a small highly industrial part of the Piedmont in upper North Carolina and southern Virginia,

[9] Reid, *op. cit.*
[10] Grove, *op. cit.*
[11] J. V. McElveen, "Low Production Farms and the Low Income Problem in Agriculture," *Farms and Farm People.*
[12] Income distribution in the United States, *op. cit.*, p. 64.

and the central blue grass area of Kentucky. The low income area, defined as areas with 50 percent or more of families with money incomes below $1,000, also extends northward through about the southern third of Missouri. Areas with 40 percent of all farm families in this class reached into southern Illinois. But with these exceptions, the Great Lakes cut over areas and subregions in New Mexico, Colorado, Wyoming, and Montana were the only areas outside the South with 30 percent or more of their farm families in this low money income class. As compared with the South's low income areas they are sparsely settled. Indeed, subregion 76, composing mainly the Southern Delta region, had nearly as many farm families with incomes under $1,000 as did the states of Washington, Oregon, California, Idaho, Utah, Nevada, Arizona, New Mexico, Colorado, Wyoming, and Montana combined.

Outside the South, most of the low income farm families seem to possess one or more of the following characteristics:

1) A family head under 25 or 65 years and over in age.
2) A family with husband or wife missing or without an able bodied male head.
3) A family who in spite of their low income possesses property and other characteristics indicating that this is not a usual situation.

In Southern agriculture, low money incomes are more common among families of the kinds under (1) and (2) above, but they are also the typical situation in nearly all parts of the region irrespective of the age and marital status of families.

Within the South, the lowest income areas as measured by median money income of farm families were in the southern black belt, whose agriculture is characterized by a heavy dependence on cotton, a high percentage of tenancy and share cropping, a high ratio of Negroes to whites, very low levels of education, and a low rating with respect to many other elements affecting production and welfare (Figure 2).

Incomes were lower among sharecropper and tenants than among owners; lower among Negroes than among whites; lower in cotton type-of-farming areas than in other type-of-farming areas and presumably lower on cotton farms than on farms of other types; lower among people completing less than an elementary level of schooling than among those going to higher grades; and lower among operators of small-sized than among operators of large farms. Probably one of the most relevant facts is that in the South 76 percent of the operators in farm operator families with incomes under $1,000 had completed less than an elementary level of schooling. This poses one of the very difficult problems faced in attempting to ascertain whether many of the South's low income operators are earning less in agriculture than they could earn somewhere else.

Many of the South's low income people may be unable to raise their productivity and incomes because of their advanced age, limited education, or other irremedial factors. The problem with respect to the region, however, is of a different nature. Given time, there is no reason why the South as a region cannot become as productive as other agricultural regions. A review of how low income areas have gotten that way reveals that it has not been through any large initial disadvantages on their part nor through their retrogression, but through their failures to keep pace in their adjustments with the progress going on about them. They cannot now over night make up differences that have been many generations abuilding. They can, however, make a start. In a rapidly expanding economy, such as we have had in the last decade and a half, they can make up those differences, if never completely, than at a very much more rapid pace than present differences have been abuilding. References to recent economic history make it appear that this cannot be done by

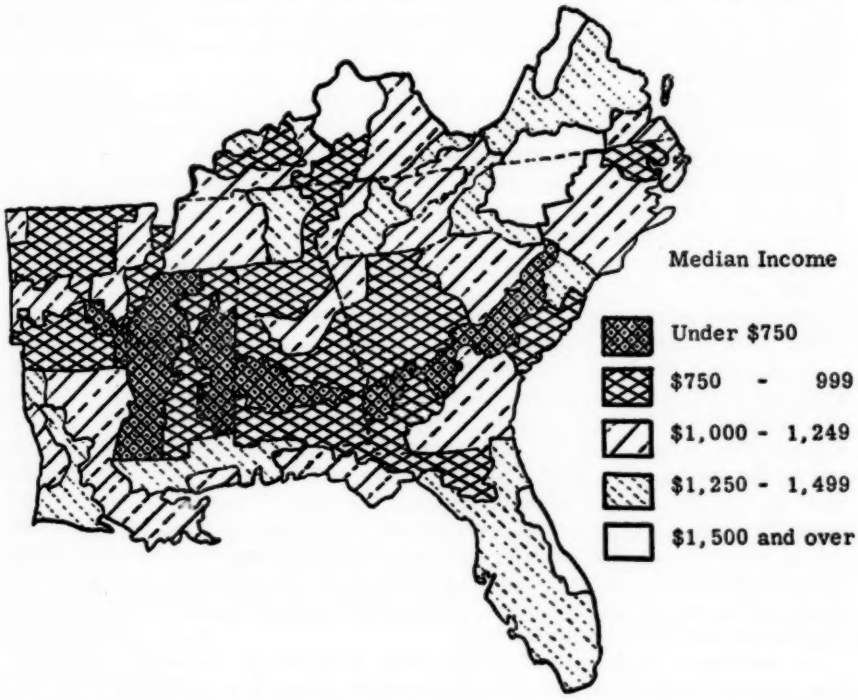

FIGURE 2. MEDIAN NET MONEY INCOME[1] OF RURAL FARM FAMILIES AND UNRELATED INDIVIDUALS BY STATE ECONOMIC AREAS, SOUTHEAST, 1949.

Source: Calculations based upon 1950 United States Census of Population.

[1] These incomes are believed to be underreported by approximately 20 percent for the United States farm population as a whole.

changes within agriculture alone. Rather agriculture has been for some time a declining industry in terms of its capacity to employ labor remuneratively. There is little on the horizon to indicate that these trends are near their peak level. Hence, whether labor within agriculture is or is not currently underemployed, a continuing rapid movement by labor out of the low income agricultural areas seems a major requirement for maintaining the incomes of farm people in such areas at their present relative level, let alone for making up the income differences between them and people in other areas or in other kinds of employment.

DISCUSSION

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Dr. Hendrix's paper is interesting and provocative in many respects. In the hope of drawing out the author, discussants often may be a little unfair in drawing implications not intended or possibly in posing questions outside the intended scope of the paper.

The introduction and title states that the author will examine, "the size and distribution of the income of farm people for their bearing upon low incomes and poverty in American agriculture as social and economic problem." He reminds us also of the importance of defining our income concept and the framework of analysis before assembling our facts. These aims and the authors stated intention to delineate major low income areas led me to look for some income size distribution data oriented more closely to the analysis of the low-income problem. But Dr. Hendrix apparently finds himself in the same dilemma which forces many research workers to use available statistics which may fit poorly their theoretical framework.

In general I think we agree that statistics available on income size distributions for farm operators leave much to be desired. Most sample surveys are not designed for a single purpose. Very often the schedules are developed by a committee whose members are trying to get different types of information out of the survey. As a result, the researcher may have to be content with the most he can get in a committee bargaining process. Moreover, even the most carefully designed sample and schedule will be subject to such errors as arise out of omissions of data by the interviewer, interviewer bias, non-interviews, and substantial under-reporting of income and expenditure data. Thus, the construction of an income size distribution usually requires fairly arbitrary adjustments and blow-up techniques.

An intelligent evaluation of employment alternatives, according to the author, cannot be based on income considerations alone. It is unlikely that we can ever get an empirical income measure which explains why people prefer one way of life to another. As a result Dr. Hendrix concludes that we must use data available but recognize that the simple cross-sectional view of income size distributions examined within a static framework of analysis cannot give a full determination of their economic meaning. Thus his thesis is that such statistics take on meaning only in a time perspective. His developmental frame

work seems to center about "activities for which the key questions are not the most efficient use of resources and the best distribution of income but such questions as (1) What are resources? (2) How are wants and values changed and markets developed? (3) How are resources created and increased? and (4) How do they acquire the attributes of property and ownership . . . ? These examined in a time perspective, he feels, are the truly key questions in an explanation of income differences.

I agree with the basic importance of the questions posed especially those relating to the command of resources as an explanation of income differences, both at a point in time and over a long run. But the time perspective analytical framework is not obvious to me. Does the author mean an appraisal of income size distributions at different points in time in order to discover factors contributing to income differences? I sort of shift gears here and look on the cross section data as a picture of the situation which now exists, while his key questions seem to relate more to the problem of differential rates of growth and development of resources and their productivity over time. Does Hendrix intend to only whet our appetities at this point? Possibly he could elaborate somewhat on the meaning of the questions and how they fit into his analytical framework. This would give us a better insight into his thinking on the long-run forces which motivate people and explain income differences over time. What are some of the major reasons for low incomes in agriculture, particularly in the South when considered in a time perspective? In the last paragraph of the paper, the author explains low-incomes as a failure of some people to keep pace with adjustments going on about them. Is this thesis consistent with the key questions posed and the facts presented by Hendrix? Such a thesis seems to imply that limitation of resources is not necessarily a problem. Furthermore, this explanation really tells us little about why these people fail to keep pace with progress around them.

Recognizing the limitations of available data, Hendrix delineates the low-income areas in agriculture in terms of what he considers rather inadequate cross-section data for the year 1949. However, we must agree that the Census data quite effectively point out a substantial body of low income and possibly underemployed rural people. Having outlined the low income problem, it seems logical to inquire at this point about policy and program formulations which might be made on the basis of this research. Will it be necessary to make more detailed studies of the people in major low-income areas to determine factors which influence choice of occupation, goals and drives? What might be gained from a study of areas in which population shifts are now taking place? Will the problem continue to correct itself with further growth, development and prosperity in the economy, or will it be further aggravated? What policy recommendations might be made on a State and/or Federal level which would facilitate desired shifts with a maximum freedom of choice of the people involved?

ECONOMIC DEVELOPMENT AND ADJUSTMENTS IN SOUTHEASTERN LOW INCOME AGRICULTURE*

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ECONOMIC development does not take place at the same rate throughout the economy. Changes in technology, in quantity and form of capital in population and labor supply, in consumer preference patterns, in institutions, and in economic organization alter the relative profitability of particular courses of action by entrepreneurs. Farmers who seek to maximize real returns for the services of resources which they control are continuously confronted with problems of adjustment in resource use to changes in their economic environment.

Agricultural adjustments to economic development can be considered from the standpoint of changes in the conditions underlying the supply schedule for farm products or of changes in conditions underlying the demand for farm products. Changes in demand conditions orginate largely in nonfarm sectors of the economy. Changes in supply conditions, on the other hand, may result directly from changes in the productivity of resources in agriculture, or indirectly as a consequence of changes in the demand for factors in nonfarm sectors. The purpose of this paper is twofold; (1) to indicate the major adjustments which farmers in the aggregate in the Southeast have made to recent changes in their economic environment, and (2) to examine the character of industrial development in the Southeast in relation to the adjustments which have occurred in agricultural production and resource use.[1]

Development of Agriculture

Changes in income and in relative prices

Real income per farm operator family in the Southeast increased substantially during the prosperous decade of the 1940's. Using 1939 as a base, the index of net income from agriculture per Southeastern farm operator family in 1949 was 370 compared with an index of 235 for nonfarm families in the U. S. with wage and salary incomes.[2] Prices of

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** In the development of this paper I have benefited from the suggestions of my colleagues at North Carolina State College.

[1] The Southeast refers to Virginia, North Carolina, South Carolina, Georgia, Kentucky, Tennessee, Alabama, and Mississippi.

[2] U. S. Department of Commerce, *Survey of Current Business*, U. S. Bureau of the Census, Census of Agriculture 1950 and Current Population Reports P-60, No. 7.

cotton and tobacco, the two major crops in the Southeast, increased relative to the prices of other crops during this period.[3] Prices of livestock and livestock products increased relative to prices of crops. The changes in product and factor price relatives provided an incentive for changes in agricultural production. The price of labor increased sharply in relation to prices of other factors.

Changes in production of farm products

Farmers in the Southeast responded to the changes in their economic environment by changing the combination of products and combination of factors used in the production of farm products. With the exception of cotton and wheat, total production of each of the major crops increased during the 1940's (Table 1).

TABLE 1. CHANGES IN PRODUCTION AND IN SELECTED INPUTS PER UNIT OF MAJOR CROPS PRODUCED IN THE SOUTHEAST, 1939–41 TO 1949–51

Crop	Production	Land Input		Labor Input	
		Total	Per Unit of Product	Total	Per Unit of Product
	Per Cent				
Corn	+17.3	−22.3	−33.7	−47.1	−54.9
Cotton[a]	− 9.2	−13.6	− 4.9	−36.1	−29.6
Wheat	−13.5	−26.5	−15.1	−63.4	−57.9
Oats	+38.8	+18.2	−14.7	−39.2	−55.5
Tobacco	+42.3	+ 1.9	−28.4	+10.0	−22.7
Peanuts	+16.6	+ 4.0	−10.8	−25.0	−35.7

Sources: R. W. Hecht, *Farm Labor Requirements in the United States*, FM 59, Bureau of Agricultural Economics, April 1947, R. W. Hecht and K. R. Vice, *Labor Used for Field Crops*, Statistical Bulletin 144, Agricultural Research Service, June 1954, and *Agricultural Statistics*.

[a] Due to heavy boll weevil damage, cotton yields were abnormally low during 1949 and 1950, Substituting 1951–53 for 1949–51 for cotton the following percentages are obtained: +12.1. −9.9, −19.7, −34.3, and 41.4.

In response to the increase in relative profitability, livestock production in the Southeast has increased phenomenally since 1940. The number of cattle and calves increased by 3.8 million between 1940-53, an increase of 51 percent. The number of dairy cows and heifers increased by 506 thousand or 15 percent. Perhaps the most striking change was the increase in broiler production from 19.8 millions in 1940 to 323.9 millions in 1953.

Changes in Use and in Productivity of Resources

The increase in relative profitability of farm production during the 1940's provided an incentive for the development of additional farm land.

[3] *Agricultural Statistics*, 1953.

The amount of land in farms in the Southeast was increased by 4.7 million acres between 1940 and 1950. This represented an increase of 3.3 percent above the 1940 level.

The average acreage per farm in the Southeast increased from 80.5 in 1940 to 90.0 in 1950, an increase of 12 percent.[4] There was also a change in the size distribution of farms. Farms with less than 10 acres and those with more than 180 acres increased in number.

The increase in the amount of land operated per farm resulted from a decline in the number of croppers and tenants and an increase in the number and size of farms operated by owners.[5] The number of tenants decreased 31 percent and the average acreage of land operated by tenants decreased 7 percent. The number of full owners increased 8 percent and the average amount of land operated per owner increased 5 percent.

The increase in number of farms with less than 10 acres was due to an increase in part-time farming and in residential farms. In 1950 there were 229 thousand part-time farms and 434 thousand residential farms in the Southeast, 39 percent of all farms.

Substantial changes also occurred in land use. These changes reflect the increase in relative importance of livestock production. One of the major changes was a decrease in the amount of land used for row crops and an increase in pasture acreage. The amount of land used for production of corn and cotton decreased sharply. Acreage of corn harvested decreased by 7 million acres between 1939 and 1953. Cotton acreage decreased by 773 thousand acres.

Production per unit of land increased for each of the major crops (Table 1). For example, the yield per acre of corn increased from 17 to 26 bushels between 1939-41 and 1949-51. During the same period the yield per acre of tobacco increased from 951 to 1, 328 pounds and the per acre yield of cotton increased from 273 to 287 pounds of lint. The 1949 and 1950 cotton yield was greatly reduced by boll weevil damage. The 1951-53 yield of cotton was 340 pounds of lint per acre.

The changes in land use and the increased productivity of land have also been stimulated by changes in factor prices. Since 1939, the increase in fertilizer and machinery and equipment prices have been relatively small. The price of labor, on the other hand, increased relatively more than that of any other major input. Hence farmers have substituted capital in the form of fertilizers, machinery and equipment, for land and

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[4] Undoubtedly, a considerable part of this change can be accounted for by the change in definition of a farm in 1950. Most of this effect, however, likely was in the 1 to 10 acre size group.

[5] Q. W. Lindsey, "Farm Tenure in the Southeast: The Framework for Long-run Adjustments," Southeast Land Tenure Research Committee Publication No. 13, 1954.

labor. The amount of fertilizer purchased by farmers in the Southeast increased 96 percent between 1939 and 1952.[6] The number of tractors on farms increased by 325 thousand and the number of workstock decreased by over 1 million, approximately 34 percent of the total.

The change in the price of farm labor in the U. S. has been brought about by a large decrease in the amount of labor on farms. There was a decrease of 18 percent, or 1,805,000 in the farm population in the Southeast between 1940 and 1950.[7] This figure, however, does not represent the extent to which farm people have migrated from agriculture to other uses of their resources. The natural increase in the population and the increase in birth rates during the 1940's tended to offset the migration of people from farms in the Southeast.[8] When census survival rates are applied to the 1940 farm population it is estimated that approximately 3.5 million people migrated from farms in the Southeast to other residences between 1940 and 1950.[9]

In addition to the large net migration of people from farms the farm labor supply also was decreased by transfer of members of farm families to nonfarm employment. Many farm residents in the Southeast work very little on farms and are essentially full-time nonfarm employees. In 1950 there were 756 thousand farm residents in the Southeast whose major occupation was in nonfarm industries.

Rough estimates of the extent to which the farm labor supply changed between 1940 and 1950 can be obtained from data contained in the Census of Population and other secondary sources. By subtracting from the farm population (1) children less than 10 years old, (2) individuals who were unable to work, (3) persons whose major occupation was in non-agricultural employment, (4) an allowance for school attendance, and (5) housewives,[10] and converting the remaining labor to man-equivalents (using as weights wage rates paid for hired farm work by age groups) one can obtain an estimate of the manpower on farms. An adjustment to include labor contributed by nonfarm residents can be obtained by the addition of urban and rural nonfarm residents whose major occupation was in agriculture.

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[6] *Agricultural Statistics.*

[7] The Bureau of the Census estimates that for the U. S. there is a downward bias between 1940 and 1950 of approximately 9 percent in the farm population as a result of a change in the definition of the farm population. A bias of 9 percent would account for approximately 51 percent of the decrease in farm population in the Southeast.

[8] Although birth rates increased in the Southeast between 1940 and 1950, the increase was less than in the rest of the U. S.

[9] Due to the change in definition of farm population, this procedure also overestimates net migration.

[10] It is assumed that housewives assist with the chore work and garden only.

By the use of this procedure it is estimated that farm labor in the Southeast decreased 31 percent between 1940 and 1950 (Table 2). Labor inputs in Southeastern agriculture decreased only 18 percent. Hence the amount of time worked per worker increased. The man-hours of work performed per man-equivalent of farm labor increased 18 percent between 1939 and 1949. Migration and the increase in labor input per

TABLE 2. SUPPLY, UTILIZATION, AND PRODUCTIVITY OF FARM LABOR, SOUTHEASTERN AGRICULTURE

Item	1939	1949	Per Cent Change 1939 to 1949
Farm labor (Man-equivalents)	3,127,557	2,163,333	−30.8
Labor used on farms (Man-equivalents)	2,055,580	1,687,662	17.9
Farm work per man-equivalent of farm labor	.66	.78	+18.2
Net income from agriculture			
Per man-equivalent of labor used on farms,			
Unadjusted (dollars)	448	1,515	+238.2
Adjusted (dollars)	448	757	+69.0

Sources: U. S. Census of Population 1940 and 1950; *Labor Force Employment and Unemployment in the United States*, 1940–1946, U. S. Bureau of the Census Report, Series P-50, No. 2; *Annual Report of the Labor Force*, 1948, U. S. Bureau of the Census Report, Series P-50, No. 13; L. J. Ducoft, et al. *Wages and Wage Rates of Hired Farm Workers, United States and Major Regions Reports* Nos. 4 and 16. R. W. Hecht, *Farm Labor Requirements in the United States*, FM 59, Bureau of Agricultural Economics, April 1947; R. W. Hecht and K. R. Vice, *Labor Used for Field Crops*, Statistical Bulletin 144, Agricultural Research Service, June 1954; *Agricultural Statistics;* and *Survey of Current Business.*

farm worker absorbed much of the idle man-power in Southeastern agriculture.

Productivity of labor used in agriculture has also increased. This has been particularly true in crop production where technological change and substitution of capital for land and labor have resulted in higher yields per unit of labor employed. For example, although production of corn increased by 17 percent between 1939-41 and 1949-51, the labor input in corn production decreased 47 percent (Table 1). The amount of labor used to produce 100 bushels of corn decreased 55 percent. Labor used to produce a bale of cotton decreased 30 percent. The amount of labor used to produce 100 bushels of wheat and 100 bushels of oats decreased 58 percent and 56 percent respectively. Thirty-six percent less labor was used to produce 100 pounds of peanuts. In the production of tobacco, which requires more labor per unit of land than any other major crop in the Southeast, the amount of labor used to produce 100 pounds of product decreased 23 percent.

Net income from agriculture per man-equivalent of labor used in Southeastern agriculture increased from $448 in 1939 to $1,515 in 1949.

Deflating the 1949 data by changes in the wholesale price index indicates a value of $757 for 1949. This represents an increase of 69 percent.

In spite of the progress which was made in increasing resource productivity during the 1940's net income from agriculture per farm operator family in the Southeast decreased relative to the net income per farm operator family in other regions. It is my belief, however, that this has provided little incentive for Southeastern farm families to transfer to farm production in other regions.[11] Farms in the Southeast are characterized by relatively large quantities of labor in relation to capital. In the production of cotton and tobacco the marginal return for labor when large quantities of labor are employed per unit of capital is relatively high. Given the capital and labor resources controlled by Southeastern farmers, it is my belief that the changes in farm labor have not resulted from migration of labor to other farming areas. Rather the migration of labor from Southeastern farms, the increase in nonfarm employment of farm people and in part-time farming likely have been due to a decline in the marginal return for labor services in Southeastern agriculture relative to the return for labor in nonfarm uses. An examination of the character of the industrial development in the Southeast should be helpful in interpreting the recent changes in Southeastern agriculture.

Economic Development in Nonfarm Sectors and Adjustments in Agriculture

Industrial development may bring about adjustments in agriculture in two ways. First, through changes in the demand for farm products. Second, through changes in the supply of resource services to agriculture. The nature and magnitude of these changes will depend upon the location and characteristics of the industrial development and upon the nature of the supply of factors, particularly labor, to agriculture.

Industrial development which results in a transfer of labor from farm to nonfarm employment and an increase in real incomes should bring about an increase in the demand for farm products. The demand for locally produced perishables, in particular, is likely to be increased as a result of industrial expansion. In this paper, however, I shall not consider the changes in demand for farm products but shall concentrate on the impact of industrialization upon the factor markets, particularly the market for labor. The remainder is to be considered as the statement of an hypothesis regarding a role that part-time farming plays in economic development of the Southeast. My remarks are based largely upon informal observation and discussion with part-time farmers rather than upon statistical analysis.

[11] Charles E. Bishop, "Underemployment of Labor in Southeastern Agriculture," *This Journal*, Vol. XXXVI, No. 2, May 1954.

An expansion of nonfarm economic activity would be expected to increase the marginal value productivity of labor in nonfarm sectors, to change the supply of labor to agriculture and consequently to have indirect effects upon the supply of farm products. Whether, in fact, this will occur in a particular setting, however, depends upon the nature of factor supplies existing in agriculture.

Southeastern agriculture is characterized by relatively large quantities of "underemployed" labor. In fact, much of this farm labor apparently earns nothing in agricultural production. If labor which is transferred from farms is not used in agricultural production, nonfarm employment can be increased without agricultural output being decreased. That is, within limits nonfarm employment may be supplementary to farm employment. Within these limits the supply of farm products will be independent of conditions in the market for labor in nonfarm occupations, and one would expect little or no change in utilization or productivity of labor in agriculture. Such changes as occur would result from the combination of additional capital with labor.

On the other hand, if off-farm employment competes with farm employment in the use of labor, one would expect those farms from which labor migrates to off-farm employment to decrease production of those commodities which require large quantities of labor in relation to other resources.

There is a basic difference in industrial development within the Southeast and in industrial development outside the Southeast in the nature of the changes which can be brought about in factor employment. If the industrial development occurs outside an area, it is necessary for factor owners to transfer their resounces from the area in order to gain extensively from the expansion in industrial activity. This, of course, involves migration of labor.

On the other hand, if the industrial development occurs within an area, this not only opens up the possibility of migration from farms to nonfarm employment but also creates opportunities for part-time farming; i.e., the combination of farm and nonfarm uses of labor resources.

Part-time farming has become an important source of employment in the Southeast. In 1949, approximately 38 percent of the farm operators in the Southeast were employed in off-farm work and 22 percent worked off the farm for 100 days or more.

As previously indicated, the number of farm residents whose major occupation in 1950 was in nonagricultural industries was 756 thousand. During 1949, 30 percent of the farm families in the Southeast received incomes from off-farm sources greater than the income received from the sale of farm products.

Part-time farming provides a means whereby farm families may continue to live on farms and supplement their earnings through nonfarm employment. The level and expected variability of earnings in farm and nonfarm uses of labor are factors influencing decisions of resource owners to engage in part-time farming. A large majority of the families engaging in part-time farming live on small, subsistence or semi-subsistence farms. Net family income and productivity of labor are low on such farms. The variability of incomes on these farms, however, is relatively low since the effects of price changes on income are smaller than in the case of commercial farms.

Short-term rates of return for resource services in nonfarm sectors may exceed expected returns from the use of comparable resource services on small farms. Likewise the probability of obtaining a high income may be greater in nonfarm than in farm uses of resources. But if there is a divergence in short-run and long-run expectations such that a farm family anticipates high income variability in full-time nonfarm work, the family will be more likely to engage in full-time or part-time farming.

The expected variability of income, however, is not the sole factor likely to be considered in decisions regarding farm and nonfarm uses of resources. The higher variability in nonfarm income may be offset to some extent by the possibility of obtaining a level of income in the long run from part-time farming than from full-time operation of small farms. The ultimate decision of the farm family with regard to part-time farming will be determined by the family's expectations regarding future returns from farm and nonfarm employment and the willingness of the family to accept risk.

An examination of the employment characteristics of nonfarm industries in the Southeast should be helpful in gaining insights as to the reasons for the development of part-time farming and the role that it plays in economic development of the Southeast. Nonagricultural employment in the Southeast increased at a relatively high rate between 1939 and 1953. There have also been significant changes in the rate of development of particular industries.[12] The relative expansion in construction work was greater than in any other major industry category followed by finance, wholesale and retail trade, and manufacturing.

The nature of the absolute changes in nonagricultural employment, however, were quite different from the relative changes. Manufacturing, with an increase of 757 thousand workers, had the greatest change in level

[12] Cf. S. H. Robock, "Industrialization and Economic Progress in the Southeast," *Southern Economic Journal*, April 1954, and J. R. Motheral, "The Competitive Position of Southern Agriculture," a paper presented to the Association of Southern Agricultural Workers, Dallas, Texas, February 1954.

of employment. Thirty-five percent of the nonagricultural employment in the Southeast is in manufacturing industries.

In 1950, manufacturing provided employment for 36 percent of the rural farm residents in the Southeast whose major occupation was in nonagricultural industries. The furniture, lumber and wood products industries, and textile industry were the most important sources of employment among the manufacturing industries. The number of workers required to staff plants in these industries is so small that a dense farm population can provide sufficient workers for typical plants.

In 1950, eighty-two percent of the lumber and basic timber products plants in the Southeast employed less than 20 workers.[13] Fifty-eight percent of the firms manufacturing furniture and finished lumber products employed less than 20 workers, 74 percent employed less than 50.[14] Since the raw material for these industries is located in rural areas, a high proportion of their employees are from rural areas. In 1950, twenty-seven percent of the workers in the furniture, lumber and wood products industries lived on farms and these industries provided employment for 14 percent of the farm residents with major occupations in nonagricultural industries. Labor expenses make up a large proportion of the variable costs in the furniture and lumber industries. Many of these firms manufacture on an order basis. There is considerable variation in the demand for labor in these industries.

In terms of number of employees the textile industry is the largest industry in the Southeast. In 1950, forty-seven percent of the textile employment was located in the Southeast. The textile industry is highly competitive. It is composed of many small firms. There are more than 9,000 textile establishments in the U. S. and approximately 60 percent of these employ less than 100 employees. At the product level no firm controls more than 3.2 percent of the value of sales of the industry.[15]

There is great flexibility in the operation of the typical textile plant. The plant can operate three shifts, twenty-four hours per day, or it can operate to any extent less than this. Wages constitute a high proportion of the variable expenses.

Since textile firms require relatively large quantities of labor, they tend to locate in areas with a large labor supply. There is a major difference in the source of labor to textile plants located in the Southeast and to those in other regions. Fifty percent of the labor supply of textile firms in the Southeast live in rural areas and 12.5 percent live on farms. In the non-

[13] *County Business Patterns, First Quarter 1950,* U. S. Department of Commerce, Bureau of the Census, Washington, D. C., 1952.

[14] *Ibid.*

[15] Financial Statistics of Textile Mills, *America's Textile Reporter,* Vol. LXVIII, No. 17, April 29, 1954.

Southeast less than 20 percent of the labor supply for textile plants come from rural residences and only 3 percent live on farms. Ten percent of the Southeastern farm residents who were engaged in nonfarm employment in 1950 were employed in the textile industry.

The large reserve of underemployed labor has been a factor contributing to the development of the textile industry in the Southeast. The labor reserve has contributed a relatively large dependable source of labor with productivity apparently equal to that of labor in other regions and at a wage rate certainly no higher than in other regions.[16] Furthermore, alternative employment, other than on low-production farms, in many areas is very limited. In this setting, plant owners have been able to locate a dependable, stable labor supply.

Confronted with a highly elastic supply of labor, a factor which constitutes a large proportion of the variable expenses, many firms are inclined to produce on an order basis. The firms in the industry are not inclined to store inventories. The highly elastic labor supply enables a plant to cease operation when orders have been filled. This situation reduces the financial needs of plants. In effect, the inventory of many plants is carried at little or no cost in the form of a dependable labor supply rather than in the form of a store of commodities.

The variation in labor input in the textile industry is relatively large. For example, from 1948 to 1953 the coefficient of variation of employment in the textile industry was 1.31 percent and was lower than in any other major industry group in North Carolina (Table 3). This indicates a stable labor supply. The coefficient of variations of actual man-hours employed, on the other hand, was 7 percent and was relatively high. This suggests an unstable demand for labor. These data are consistent with the hypothesis that firms in the textile industry are confronted with highly fluctuating product demands and tend to locate in areas which have a large dependable supply of labor. This enables the firms to operate with substantial variation in labor inputs and to shift part of the financial risk of operation to the labor force.

Allocative decisions of laborers made under these conditions tend to encourage part-time farming and to discourage the migration of labor from farm to full-time nonfarm employment. If the planning horizon of farm people is limited to the area observed by relatively large fluctuations in employment and earnings, these people are likely to be more reluctant to transfer to full-time nonfarm employment than they would be if a stable employment pattern were expected. Confronted with unstable nonfarm income expectations and low but stable farm income expecta-

[16] S. H. Robock and J. M. Peterson, "Fact and Fiction about Southern Labor," *Harvard Business Review*, March-April, 1954, pp. 83-84.

tions, farm people are prone to engage in part-time farming and to use nonfarm employment as a means of supplementing farm earnings rather than as a source of full-time employment.

Now let us consider for a moment the likely effects of the increase in incomes of farm families resulting from part-time farming in this setting. One might expect that a large proportion of the earnings of people faced with unstable employment and income would be invested in expanding

TABLE 3. VARIATION IN EMPLOYMENT AND LABOR INPUTS IN SELECTED INDUSTRIES IN NORTH CAROLINA, 1948–1953

Industry	Employment[a]		Labor Input[b] (Man-hours)	
	No. (1000's)	Coefficient of Variation %	No. (1000's)	Coefficient of Variation %
Non-agricultural employment	933.33	2.26	[c]	
Total manufacturing	420.78	2.86	65,640	4.84
Lumber and timber basic products	41.51	3.11	6,936	4.88
Furniture & finished lumber products	31.82	3.23	5,212	6.29
Textile mill products	228.74	1.31	34,568	6.68
Apparel & other finished products	13.59	4.43	2,012	7.26
Food & kindred products	20.40	3.84	3,468	5.81
Tobacco manufacturers	28.31	21.60	4,364	26.16
Cigarettes	12.85	1.36	1,984	6.56
Stemmeries and redrying	12.58	49.18	1,976	55.75
Paper & allied products	8.46	2.33	1,504	3.20
Total non-manufacturing	512.54	2.53	[c]	
Wholesale trade	40.11	1.77	7,052	2.20
Retail trade	136.76	5.26	21,752	4.65
Contract construction	51.99	6.85	[c]	
Transportation & public utilities	58.13	1.72	[c]	
Finance, insurance, & real estate	22.26	2.42	[c]	
Service	87.82	2.01	[c]	
Government	112.25	3.25	[c]	

Source: C. R. Pugh, "Factors Influencing Level of Income and Income Distribution in the Northern Piedmont Area of North Carolina," unpublished thesis, North Carolina State College, 1954.

[a] Based on arithmetic mean of years, 1948–1953, which in turn is based on average of monthly employment estimates within the year.

[b] Computed by averaging the mean monthly inputs of man-hours for the respective years.

[c] Data on hours worked per week not available for these industries.

the farm business and in increasing the productivity of resources employed in agriculture. There is some evidence that this does occur, particularly when sufficient labor resources are transferred from farm to nonfarm employment to enter the region of competition between the two uses. In 1951, in the Southern Piedmont Area of North Carolina, for example, a higher proportion of the operators of part-time farms had purchased tractors and other labor saving equipment than operators of

other low-production farms. In this particular Area there was little evidence, however, of additional income received from off-farm employment being used to expand the farm business.

To increase the farm business to a size that would yield a return for labor services equal to the return which likely could be received in nonfarm employment would require a large increase in capital investment and a change in farming systems on most small farms. Furthermore, the variability of the expected net revenue from farming likely would be increased. On the other hand, the majority of the nonfarm employment of farm people in the Southeast is in industries producing perishable or semidurable commodities. Lay-offs in these industries are expected to be temporary. These factors have tended to stabilize part-time farming.

A high proportion of the additional earnings from nonfarm employment of farm people is spent for consumer durables such as automobiles, refrigerators, washing machines, television sets, and bathroom fixtures. This is particularly true when female members of the household are engaged in nonfarm employment since many of these items are labor-saving in the performance of household work and thus may be regarded as income generating.

The nature of conditions in the credit market have facilitated the use of additional income in the purchase of consumer durables. Credit is readily available for most consumer durables. On the other hand, "the down payment" required to finance even relatively minor adjustments in farming often greatly exceeds the savings of families on small farms.[17]

Summary

Recent economic development has greatly improved the lot of farm families in the Southeast. Within the farm sector changes have occurred in commodities produced, in technology, and in factor combinations which have increased the productivity of resources employed in agriculture. Expansion of economic activity in nonfarm sectors has created additional nonfarm job opportunities. Migration has drained off large quantities of labor from low production farms in the Southeast. Local industrial development has provided an opportunity for an expansion in part-time farming. The low productivity of labor in agricultural employment has contributed to the industrial development in the Southeast. In turn, the nature of the industrial development has influenced the adjustments which have taken place in agriculture. The supply of resources to agriculture is a function of the return expected by owners for resource services in alternative employment. An understanding of the nature of the supply of

[17] W. E. Hendrix, "Availability of Capital and Production Innovations on Low-income Farms," *This Journal*, Vol. XXXIII, pp. 66-74.

resources to agriculture cannot be obtained without an understanding of the conditions under which allocative decisions are made.

DISCUSSION

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The purposes of Professor Bishop's paper were "(1) to indicate the major adjustments which farmers in the Southeast have made to recent changes in their economic environment and (2) to examine the character of industrial development in the Southeast in relation to the adjustments which have occurred in agricultural production and resource use." These two tasks provide convenient dividing lines between the two major sections of his paper.

In the first section of the paper Bishop is concerned with demonstrating that a combination of technological advances and substitution of land, non-land capital inputs and current inputs for labor has permitted the agriculture of the Southeast to expand its output in response to an increasing regional and national demand for farm products over the last decade and a half. An important result of these developments has been increased labor productivity and rising income per farm family from farming.

These developments are rather widely recognized and for this reason I wish that he had devoted more time in developing the more interesting and significant second section of his paper. In the second section, Bishop puts forward a number of provocative hypotheses in an attempt to explain the factors which have permitted the rapid declines in labor input and the influence of these declines on the agriculture of the region. I would like to examine four of these hypotheses with reference to some work which we have recently completed at TVA.

Hypothesis 1. Underemployment in southeastern agriculture is so extensive that substantial declines in farm employment can occur without substantially affecting farm output. Experience in the Tennessee Valley during the last decade and a half seems to indicate that this hypothesis is substantially correct for at least some areas of the Southeast. Analysis of data for 201 Tennessee Valley region counties indicates that the declines in farm employment that did occur between 1939 and 1949—as a result of out-migration and shifts to non-farm jobs locally—did not have an adverse effect on the total farm output of the region. On the average, total farm income rose as rapidly in those counties with large declines in farm employment as in those counties with small declines. The extent to which this result is due (a) to the low productivity of those workers who left agriculture between 1939 and 1949 and (b) to the substitution of non-labor inputs and new technology for labor inputs is not entirely clear. Nevertheless, it seems safe to conclude that in many parts of the Southeast even greater declines in the number of farm workers might have permitted even more rapid increases in labor productivity without affecting the total farm output.

Hypothesis 2. A substantial share of the recent increase in employment in manufacturing in the South east can be attributed to the location of labor oriented industries in an area of substantial underemployment. Although Bishop's analysis is mainly related to the textile industry, this proposition

seems generally valid. In the Tennessee Valley, for example, where textiles are relatively much less important than for the Southeast as a whole, 45 percent of the entire increase in manufacturing employment between 1929 and 1950 was accounted for by labor oriented industries. Market oriented industries accounted for about 32 percent of the increase while materials oriented industries accounted for only 20 percent of the entire increase (3 percent of the increase could not be conveniently classified.)

Hypothesis 3. Existence of a labor surplus has permitted manufactures in labor oriented industry to shift part of the uncertainty resulting from fluctuations in the demand for their products to their employees. Part-time farming represents an attempt by workers to meet the risk of unemployment by diversifying their sources of income. Before accepting this hypothesis as generally valid for the Southeast as a whole I would like to see Bishop extend his analysis to areas other than the Piedmont areas of North and South Carolina. The pattern of industrial development in many parts of the Southeast has not occurred in small towns and rural areas to the same extent as in the areas which he has analyzed.

In the 201-county Tennessee Valley region, for example, the 13 counties which lie within the boundaries of 7 metropolitan areas accounted for almost 60 percent of all employment in manufacturing in 1950 and approximately the same percentage of the increase in manufacturing employment between 1929 and 1950. Even in the textile industry, which is clearly labor oriented, 47 percent of the total employment is located in the 13 metropolitan counties. This concentration of new industrial employment, including almost half of the new employment in the textile industry, in a relatively few established metropolitan centers where numerous alternatives to textile employment exist may indicate that the type of risk shifting which has been observed in the Piedmont textile industry is less important than has been suggested. If so, alternative explanations for the development of part-time farming will have to be developed. Because of its potential importance for employment policy I hope that Bishop will have the opportunity to test his hypotheses in other areas of the Southeast.

Hypothesis 4. A given increase in non-farm employment will have a greater impact on the incomes of southeastern farm families if the increase occurs in the Southeast than if it occurs outside of the Southeast. The hypothesis that the incomes of farm families are strongly affected by the level of local non-farm development seems valid both for the Southeast and for the Nation as a whole. When we plot the median incomes of rural farm families on one axis and the proportion of the total population that is non-farm on the other axis of a chart we obtain a very clear positive relationship both for the counties of the Valley region, the state economic areas of the Southeast, and the states of the Nation. Another way of emphasizing the same relationship is to point out that in 1930 only 20 counties in the entire Southeast had achieved levels of rural welfare (as measured by the Hagood level of living index) equivalent to the national average. By 1950, there were between 104 and 137 such counties (as measured by either the Hagood level of living index or the median incomes of rural farm families). The striking fact about this development is that most of the new areas in the Southeast which "caught up" with the national average between 1930 and 1950 either include, or are located in close proximity to, developing urban centers.

I do not mean to say that there are not exceptions to this general rule. In the national picture we have the example of the seven northern Great Plains States which have achieved high levels of farm income without extensive local urban-industrial development. These high incomes were achieved, however, only after a heartbreaking period of drouth, failure and outmigration during the mid-1930's followed by a period of farm enlargement and extremely high wheat prices in the 1940's. In the Southeast perhaps the most important example of an area which has achieved relatively high farm income levels without extensive urbanization is probably the Shenandoah Valley in western Virginia. It should be noted, however, that a number of the counties in the Shenandoah Valley which were above the national average in 1930 were no longer above the national average in 1950.

In concluding, I would like to make a suggestion. It has been five years since Dr. Schultz delivered his stimulating paper on "Reflections on Poverty within Agriculture" to the American Farm Economic Association meetings at Laramie, Wyoming. Since that time, we have experienced a steady increase in the publication of research relating to the nature, extent, and causes of low incomes and low-income regions in American agriculture. The colleges, the USDA, regional institutions such as the TVA, and even the Council of Economic Advisers have contributed to this discussion. Although our knowledge of the situation is much more complete than it was five years ago, we are only slightly nearer to a solution of the problem. Next year I think it would be appropriate for the Farm Economic Association to devote at least one session to a discussion of the content of program activities designed to achieve a reasonable solution to the problem of low productivity regions in American agriculture.

LAND ECONOMICS

Chairman: E. H. Wiecking, Agricultural Research Service

THE FUNCTION OF LAND ECONOMICS IN AGRICULTURAL DEVELOPMENT

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THIS paper is divided into three major parts: (1) the problem of agricultural poverty and inefficiency in a developing economy, (2) an appraisal of methodology in land economics, in order to suggest research aimed at creating policy for more uniform development, and (3) a discussion of research programs and possibilities.

Problems and Hypotheses

Agriculture in the more advanced nations is characterized by a strikingly rapid increase in the level of output per man and great technological progress among some firms and areas. But there is "stickiness" in the adjustment of factors to new situations with the result that a slowly grinding poverty affects large segments of the agricultural population. In backward or underdeveloped communities, regions and nations, agricultural poverty is acute, the percentage of the total resources required for the production of food is high. The drain on the economy in the production of food inhibits further economic development. The urgent questions are: How can the huge pockets of poverty that infect advanced or "developed" countries be substantially reduced? How can substantial progress be made in raising productivity of the underdeveloped countries? I shall pay most attention to the problem in advanced nations but many of the theories and implications are general.

Two important hypotheses come immediately to mind. (1) Substantial progress in the alleviation of poverty in most areas requires the importation of capital, such as may result from substantially improving the terms of trade for the commodities of the area or from capital grants and loans. (2) Sustaining progress in the alleviation of rural poverty, requires a reduction of the imperfections in the factor markets serving agriculture, to the ends, (a) that greater economic mobility is achieved in the labor supply and (b) that capital rationing is reduced or made non-existent. The importation of capital is required to enable technological advance to take place. But such gains as are made will not be held unless the stickiness in factor markets is reduced, or unless factor markets are such as to provide a high degree of resource mobility.

The basis for these hypotheses can be illustrated in many ways. I cannot

escape a vivid picture of the developments over the last two or three decades in the farm community where I was raised. The community is in "good" spring wheat country. Nearly all the modern technologies are employed. The rate of investment per farm is substantial. But the community on the whole appears to be decidedly worse off today, relative to urban areas, than it was when I was a boy. The statistics on farm income and productivity in many areas of the United States are not at variance with this picture. What is wrong? My hypothesis is that low labor mobility out of the area results in an inflation of the land prices and land resources which in turn results in a restriction of the family farm to a size insufficient to provide a satisfactory income. As long as this resource characteristic exists it is idle to hope that price supports can alleviate the situation or greatly improve the pattern of income distribution.

My contention is that the greatest challenge for land economics and related disciplines is (1) in determining the resource changes for land, labor and capital, in a macro-economic sense, that are required to work toward the goals of efficient resource use and uniformly high family farm income and (2) in naming and testing the public programs conceived to bring about these changes. The emphasis is different from the trend in recent advances in production economics. Instead of going into the intricate details of plant design, factor-factor, and factor-product relationships that are useful as a guide for the entrepreneur in management decisions, the emphasis is on working from the firm and household toward the major decisions in public policy that are required to reach the resource and income objectives of policy. Changes in land use, in size of farm, in employment of capital and labor, that are required to raise the value of productivity of the human agent to the level in the more advanced centers of economic development would be postulated and programs suggested to achieve these changes.

Since the discipline of land economics is most closely related to the type of research I have in mind, and in many cases points the way toward the suggested work, I turn next to an appraisal of research methodology in that field.

Appraisal of Methodology

The suggested problem formulation and hypotheses are directed toward the discovery of remedial action that can be taken to achieve certain resource and income objectives. Emphasis is placed on the "if-then" variety of hypothesis. The crucial question in public policy concerns what will happen if certain things are done. The hypothesis directed at a problem situation suggests a solution to the problem. The function of research is to test the solution. The aim is not just to accept or reject the suggested

solution but to determine the limits under which it will apply and the modifications or additional suggestions that appear to be in order. Thus research is a method of determining what can be done to achieve certain objectives of resource-use and income policy in agriculture. It serves as a basis for decision-making in formulation of public programs.

The most rigorous analysis of research methodology in land economics that has been made is presented by Salter in his *Critical Review of Research in Land Economics.*[1] Salter points out that in land utilization studies time-and-time again problems have been either vaguely formulated or have become so fixed as to deflect research from new discoveries of large significance. As a result objectives become merely counting or classification work rather than exploration of the possible source of problems and the possible means of solution. Detailed and expensive work is done without relevance to the problem that might have been stated in the hypothesis and its possible solution. Tables of data restricted to describing a given situation fail to lead to possible remedial action. Standardized groupings and classifications submerge the possible clues to public action and fail to test a meaningful hypothesis. In addition, and perhaps most important, hypotheses have not been clearly stated, irrelevant data have been introduced and conclusions are weak, not tested by the evidence. Only rarely can instances be found in which patterns of actual experience are preserved as experimental processes. Only scant recognition is given to the possibility of seizing upon controlled institution of actions as experiments to test ideas.

In his summary of methodology of research in landed property, Salter's main criticisms are that much effort has been given to describing existing lease forms and to republicizing census data, not with any purpose of revealing problems or their solution, but with the simple purpose of making data available. He found an increasing predominance of reports with no action problem posed, no problem explored and no problem solved. Instead of asking what action can be taken that will alleviate a problem that might be suggested, the studies usually ask: "What is the quantitative relationship between this set of data and that?"

In his general conclusions Salter suggests four basic steps for the improvement of research in land economics in particular and social science inquiry in general.[2] First and most fundamental is the need for a more comprehensive conception of social science inquiry, with research viewed in terms of its relevance to action. The purposes and consequences of inquiry must be given greater attention. The mechanics of research must

[1] See Leonard A. Salter, Jr., *A Critical Review of Research in Land Economics,* Minneapolis: The University of Minnesota Press, 1948, pp. 127-29, 174, 229-31.

[2] *Ibid.,* pp. 252-53.

be regarded not only as procedures for gathering data but as ways and means of observing processes of human experience as operating experiments. Differences in human experience should be regarded as offering clues to the action that must be taken to achieve the resource and income goals presented. Experience forms the basis for hypotheses about action that is required.

Second, there is need for a more careful attention to the preliminary exploration and definition of the problem. It must be recognized that reesarch has its roots—to use John Dewey's words—in the problematic situation. As Northrup comments in his book on *The Logic of the Sciences and the Humanities*,[3] one must begin with what one has at the beginning, namely, the problem. It is the problem and its characteristics as revealed by analysis that leads one to the relevant facts and to the formulation of hypotheses.

Third is the need for encouragement of the functional use of hypotheses. Hypotheses are suggested alternative lines of action and their function is to direct research to discover what might be done about the problem. In Salter's words, "The aim of research is not just to affirm or deny a hypothesis, but to expand and modify it until it represents warranted assertions, grounded in experience, as to what actions will result in a satisfactory pattern of major land uses, will create desirable landed property relations, will overcome the problems engendered by changing attributes of space." One of the greatest obstacles to effective research is found to be the persistent failure to pose a problem or a hypothesis in the form that *if* certain lines of action are instituted *then* certain ends-in-view will be attained.

Fourth, there is need for recognition of the limitations and advantages of various forms of factual materials as evidence. In land economics, where systems of public action are proposed, the use of data sequentially arranged is crucial in testing the type of "if-then" hypothesis. The goal in respect to handling of evidence is to test the full range of experience in which alternative lines of action have been tried.

Objectivity requires us to recognize that land economists in recent years generally have been aware of these criticisms and probably the criticisms do not apply with as great force now as they did previously. Also, of course, I wish to recognize that much valuable work has been done in certain areas, rural land zoning, public lands, etc. But I believe that too much effort has been given to what I would call fringe problems with the result that the accomplishments in the main stream are disappointing.

[3] F. S. C. Northrup, *The Logic of the Sciences and the Humanities*, New York: The Macmillan Company, 1949, p. 17.

This suggests that the main problems are not wholly land economic but combine a blend of land economics and something else.

The basic analysis concept proposed centers around (1) a definition of the changes in resource use that are required to reach a high level of resource efficiency and (2) a specification of the public programs are most appropriate to bring about these changes. Valuable suggestions are currently available in projects somewhat outside the field of land economics. The Michigan township extension project, for example, with an extension agent in selected townships suggests the hypothesis that *if* more extension help in planning is made available *then* efficiency of farm operations will be increased, labor productivity will increase, etc. Research connected with this project has the function of not only proving or disproving this hypothesis but of discovering the conditions under which it is valid and of determining the validity of varous modifications.[4] The operating unit approach to farm management analysis suggests the hypothesis that *if* certain proposed changes are made in capital structure, in use of land and labor on given farms, *then* net farm income will increase, labor productivity will rise, etc. The research involves a testing of the hypothesis, a determination of its limitations and a survey of various modifications.[5] In each of these methods the data are sequentially arranged to give a record of the process of human experience as an operating experiment.

On the other hand, the analysis of productivity functions or productivity coefficients which has been suggested as a basis for certain credit and land-use policies seems to me to offer relatively little promise of providing a basis for such resource adjustment policy.[6] Productivity coefficients indicate marginal rates of return; but they are static and can tell us little about the dynamics of the expansion path or what will happen when important innovations or improved techniques are adopted that bring substantial changes in scale and factor combinations. Aside from the fact that there may be intercorrelation among variables, which raises a question about applicability of the conclusion, the real problem is that when

[4] See the discussion by James Nielson in *Proceedings of the Annual Meeting of the New England Research Council on Marketing and Food Supply*, 1954.

[5] See R. G. Wheeler, "The New England Dairy Farm Management Project as an Example of the Operating Unit Approach to Farm Management Analysis," *This Journal*, Vol. 32, May, 1950, pages 201-215, R. G. Wheeler, and J. D. Black, "Farm Planning—A Trial Operation," *This Journal*, Vol. 36, May, 1934, pages 198-209.

[6] *Cf.* Earl O. Heady and Russell Shaw, "Resource Returns and Productivity Coefficients," *This Journal*, Vol. 34, May, 1954, pp. 243-57. See pp. 252-53 for recommendations for national credit policy. It is suggested (p. 253) that a change from "poor techniques" to "improved techniques" might give much greater returns to capital, but this is not tested by productivity coefficient analysis. The question of how much investment in improved techniques and in changes in scale would be optimum is not answered.

interest centers on public policy in resource use, intra-farm as well as inter-farm adjustments will be involved. Inter-farm comparisons offer only a rather limited basis for intra-farm adjustments. Such comparisons do not tell us how to go about making the far-reaching resource changes that are necessary to overcome underemployment in agriculture or how to overcome the imperfections in the factor markets.

The implications for methodology are fundamental. The determination of small incremental changes derived from productivity coefficients and productivity functions, which is helpful in short-run analyses when important factors are given, is not the major problem for research aimed at regional development policy. Here concern is with the longer run when several factors or perhaps the major volume of the factor-inputs are variable. Several problems are involved and several methodological techniques are available. First, what is to be taken as given? What assumptions are to be made about demand, about technological advance in agriculture and in the balance of the economy, about the level of employment and national income? Second, what kind or amount of public action is considered acceptable? Economists are proven to sidestep this question, and perhaps with good reason. But some assumptions must be made about the programs that are being tested. Questions about community organization, culture traits and desires, must be at least implicit in the research planning process.

One place to start is with certain assumptions about population growth, the growth in national income and productivity of the labor force outside agriculture. Good basis for making these assumptions are available in the literature. Second, assume certain objectives in agricultural land patterns and resource use. These have to do with objectives of family farm policy and minimum income criteria. Then the question is what adjustments must be made in resource-utilization patterns to meet these objectives. Attention is directed toward determining the changes in land-use that are required. Much more than changing from one major use to another is involved. Economies of scale are fundamental. Major attention is given to capital requirements, new technologies and the efficient employment of labor. The other fundamental part of the research process is to design and test the various types of public programs that can be offered as a means of bringing about the resource changes. What is the role of education in creating labor mobility? What type of farm management planning service is required? What kind of a credit program is necessary to meet the capital requirements of farms? What is the role of industrial development and off-farm employment? In answer to such questions the community and its development is viewed as an operating experiment. The researcher can contrast and compare the evolution of various selected communities or

areas that have attained different levels of economic development to discover the causal factors. He can propose and test hypotheses suggesting how economic progress is facilitated.

In the outline of specific projects several alternatives are available. One technique is to analyze farms in terms of a single average farm or a small model group of farms that embody the resource-income standards specified as the basis of policy. Farms that fall below the standard would be "adjusted" to bring them up to the stated level of efficiency. This technique is appropriate where there are low-income farms interspersed among a community containing several efficient family-sized farms. Another technique, applicable where no farms in the community come up to the accepted standard of labor productivity, is to consider the entire community as a planning area. This technique of course goes more boldly and more closely into the area of land-use planning; but the proposal differs from the land-use planning program of the late 1930's in important respects. Direct action through community and county committees is not required. Programs of action suggested would chiefly involve offering more alternative opportunities to the individual and the individual family. Acceptance of the resource analysis implies only that the family will participate in the planning process. Other than that it is up to society to develop and broaden the opportunities that will lead to a better distribution of the labor force. This involves development of broader educational opportunity, expanding employment and reducing the costs of labor mobility, providing credit facilities to meet the capital requirements of efficient family-sized farm units, and providing expanded extension-type farm management helps.

Program and Possibilities

As one looks over the evolution of American agriculture with its rapid technological development we are struck by the existence of far-reaching imperfections in the factor markets that delay the shift in resource use required to eliminate underemployment in the human agent, that retard the capital investment process in many communities and that result in misuse of soil and water resources. The challenge to research lies in the extent to which these imperfections can be overcome by the development of specifications for public policy. Only broad suggestions for policy can be indicated here.

First, the solution to the problem of resource misallocation lies first of all in creating greater labor mobility, both within agriculture and between agriculture and the rest of society. Economists have recognized this situation but they have allowed themselves to become frustrated in its solution. During the Great Depression and particularly in the land-use planning

program the complaint was that there was no place for the excess labor resources to go. The problem of underemployment could be solved if some people could move "somewhere else." During the 1940's and 1950's, however, although people became economically more mobile, the relative underemployment among the less productive one-half or two-thirds of the agricultural population remained about as great as ever. There was no public program that could operate with significant effectiveness to cut down the major sources of underemployment. Moreover the basis for the development of such a program was scarcely touched. To determine the conditions of greater mobility and the policy decisions required to facilitate mobility is an important job for research.

Second, the capital investment process in agriculture comes far from satisfying the traditional goals of owner-operation of *efficient* family-sized farms. Here we are not concerned so much with the form of tenure, although tenure is certainly germaine to the problem of efficiency, as we are with the underinvestment of capital in the farm firm. Furthermore, we are not as much concerned with the question of aggregate investment of capital in agriculture, or with the total supply of agricultural land, as we are with the allocation and distribution of capital and land among firms. The challenge for research exists in developing the changes required in the capital market to more adequately provide for the creation of efficient family-farm units.

Third, reducing imperfections in labor and capital markets, implies a regrouping or reallocation of land resources. The problems are regional, differing from one part of the country to another. In the Old Cotton Belt, for example, changes in the organization of the firm are probably required for most efficient use of modern technology.[9] In the West there are unique problems in the firm's utilization of geographically separated land resources, in multiple use of certain land resources, and in the working out of satisfactory tenure arrangements for publicly-owned land resources.[10] In the East there are problems of the rural-urban transition, zoning, the adjustment of agriculture to the competition of industry for labor.

Analysis of all three factor markets and suggested remedies may be involved in the same study. What is involved in each case is (1) the determination of the optimum resource and/or income situation, (2) a description of how the existing situation departs from the optimum, and (3) a presentation and testing of programs to facilitate shifts from the existing situation to the optimum. The hypotheses to be tested are of two types:

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[9] *Cf.* William H. Nicholls, "Multiple-Unit Operations and Gross Labor Productivity Within the Old Cotton Belt," *This Journal*, Vol. 34, November, 1952, pp. 463-81.

[10] *Cf.* M. M. Kelso, "New Directions for Land Economics Research: West," *This Journal*, Vol. 31, November, 1949, pp. 1035-42.

(1) those dealing with the causes of underemployment or resource misallocation and (2) those dealing with the action to be taken. The heart of research in land economics and related fields is in hypotheses formed on the "if-then" basis. *If* certain farm-management helps are made available *then* will the necessary resource changes take place that are required to overcome underemployment? *If* broader educational opportunities are made available *then* will labor mobility be improved and labor productivity increased? *If* credit requirements of *efficient* family farms are met *then* will farm poverty disappear? The aim is to determine what needs to be done to facilitate necessary resource allocations.

Society has paid far too high a price for our failure to establish the point that research should serve as a foundation and guide for public policy. The current income problem in agriculture is a direct outgrowth of the failure to bring the appropriate public policy to bear on the problem. Price supports and payments, around which national policy has concentrated, are necessary for stability in some cases. Reduction in uncertainty will improve efficiency. But price programs alone will not accomplish the type of resource adjustments necessary to eliminate underemployment, reduce capital rationing and regroup land resources. The cooperation of land economists with workers in fields of production economics, credit, and the broader areas of policy holds a promise of determining (1) what resource adjustments are necessary to fulfill major income and resource objectives of policy and (2) what the specifications are for public programs that will facilitate such economic progress and development.

ECONOMIC FRAMEWORK FOR WATERSHED DEVELOPMENT*

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PUBLIC efforts to improve land and water resources have been oriented largely within firms and more recently, within river basins.[1] As a result, land and water use problems which fall between the firm and the river basin have received insufficient attention in our public programs of land and water use.[2]

The "within the firm" approach has been entirely inadequate for dealing with problems extending beyond the boundaries of the firm and beyond the planning horizons of individual entrepreneurs. The river basin approach concerned primarily with water use in a multiple purpose framework, has been equally inadequate for ameliorating land and water use problems on a unified basis within constituent watersheds of river basins. Thus, a serious gap has evolved between the individual farm and the river basin approaches to land and water use problems.

There is a rapidly growing recognition by Congress, State legislatures, Federal and State natural resource agencies and interested citizens, of the necessity for developing further a third approach to land and water use problems, oriented between firms and within sub-areas of river basins.[3] This third approach, known as "watershed development" rests

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[1] With relatively few exceptions, public measures for erosion control, soil conservation and land use adjustments have endeavored to achieve their objectives through the individual farm approach. This has been the general approach of the Soil Conservation Service, Soil Conservation Districts, Agricultural Conservation Program, and the Agricultural Extension Services. At the other extreme, are basinwide programs, including the Missouri Basin, Columbia Basin, Tennessee Valley, Colorado, and Arkansas, Red and White.

[2] There are, of course, some important exceptions in the form of the Muskingum Watershed in Ohio, the 11 Watershed Flood Control Programs of the USDA under the 1936 and subsequent Flood Control Acts, ACP group payments and related measures. Also, significant land developments have occurred through the medium of drainage and irrigation districts. However, most of these measures have been motivated by specific objectives such as flood control, drainage, protection of city water supplies or irrigation and have not been directed toward the total resource problem within watersheds. On the other hand, experiences gained in these various related measures provide valuable foundations for building the watershed programs of the future.

[3] Recently enacted measures include the USDA watershed protection programs in so-called small watersheds under the Hope-Anderson and Hope-Aiken Acts of 1953 and 1954, respectively; the Iowa Conservancy District (Chapter 467B, Iowa Code, 1950), and the recently enacted legislation in Nebraska, North Dakota, and Kansas providing for Conservancy Districts. Within the past few years, an estimated 300

squarely upon the physical and economic character of the nature and consequences of the joint behavior of land and water within watersheds. Actually, the watershed approach is complementary both to the firm and the river basin techniques for improving land and water resources. For, without the watershed approach, a serious hiatus exists within our public programs of land and water resource development.

Watershed development has three important and interrelated objectives. The first objective is the maximization of the net value returns of goods and services over time from resources within watersheds, sometimes expressed in terms of a ratio of benefits to costs.[4] The second objective is the allocation of costs and compensations in an equitable manner among the various public and private participants in watershed development.[5] The third objective is the working out of cost sharing arrangements in such a manner that they contribute both toward an equitable sharing of costs and compensations and toward the maximization of net value returns over time from the watershed's resources.

The purpose of this paper is to outline a framework within which these three objectives of watershed development may be analyzed, as a guide for watershed research and development programs. The procedure followed in this paper consists of: (1) defining the watershed as an investigational and programming unit including its interrelated physical, economic, and institutional characteristics; (2) presenting basic criteria for benefit-cost analysis; (3) developing the dissociation and association theories of benefits and costs; (4) application of the compensation principle; (5) presenting fundamentals of cost allocation and criteria for cost-sharing arrangements; and (6) drawing some implications from this framework for watershed policies, programs and needed research. Obviously, this procedure does not embrace all aspects of economic analysis of watershed development. Space does not permit consideration of price and cost levels and discount rates. These and related aspects have been omitted in order to devote attention to the more fundamental economic problems of watershed development.

Physical and Economic Character of Watersheds

The only unique physical characteristic of a watershed is that it is a

organized associations and 500 informal groups have come into being for purposes of solving problems within watersheds as reported by Erwin C. Ford. "The Small Watershed Gets Attention," *Soil Conservation Magazine*, Vol. XVIII, No. 9, December, 1953, Supt. of Doc., Wash., D. C., p. 110.

[4] This concept of maximization includes the reduction of losses as well as further increases in goods and services.

[5] The term "participant" in watershed development is used throughout this paper to identify each private individual and each public entity that is damaged or benefited, contributing resources or otherwise affected by the development.

hydrologic unit of space composed of an interrelated drainage area with a common movement of water including all the consequential implications for land and water use. The only unique economic characteristic of the watershed is that the hydrologic unit also provides the basis for an economic unit of analysis, made up of two or more sub-economic units or firms. The watershed thus becomes an aggregation of firms and purposes unified through interrelated physical and economic problems. The watershed is also a segment of a river basin or larger watershed. The watershed usually, although not always, embraces multiple purposes. The size of the watershed may vary from two to many farm operating units and landownership tracts.[6]

The interrelated consequences of these physical and economic characteristics provide the basis for delimiting and diagnosing problems and for developing and appraising alternative solutions for watershed development. This implies that physical data must be obtained and presented in a manner amenable to economic analysis. This also means that the economic framework should provide a guide for the kind and quality of physical data needed in economic analysis.

The Watershed Firm Concept

In developing an economic framework for delimiting and analyzing watershed problems and possible solutions, the watershed may be regarded as a "watershed firm."[7] The watershed firm concept provides an economic entity which can be analyzed in terms of benefits and costs regarding particular levels of output of goods and services and the associated costs and revenues. This concept also provides an economic entity for which costs and revenues may be equated in a marginal framework.

The watershed firm differs from the farm firm in that it is made up of many farm firms (at least two) and other participants with varying (often times conflicting) objectives of the entrepreneurs, different situations in which to achieve their objectives, and varying costs and benefits incident to the development of the watershed as a whole.

This watershed firm concept provides a basis for analyzing benefits and

[6] Referring to watershed size in the USDA Small Watersheds program, Erwin C. Ford states, "The watershed protection demonstration projects will range in size from as little as 12 square miles to as much as several hundred square miles." *Op. cit.* p. 10. Other watershed programs involve even fewer farms. For example, the First Iowa Conservancy District established under the 1950 law, is made up of only seven farms.

[7] This concept is developed and this term is used throughout this paper because the watershed as an economic unit may be regarded as a firm for purposes of benefit-cost analysis. Furthermore, the watershed firm rests largely upon property interrelationships between all public groups and agencies and all private people involved in the development of a watershed.

costs for the watershed as a whole, encompassing all levels of public and private interests. It also provides a basis for the interrelated analyses of resulting benefits and costs accruing to each constituent part of the watershed in the form of operating units, ownership tracts and publics.[8]

Basic Criteria for Benefit-Cost Analysis

In terms of objective one, previously stated as the maximization of net value returns over time, benefits and costs of present and various future watershed development alternatives require determination. This determination is made for the watershed as a whole and includes all benefits and all costs directly related to the development regardless of their incidences.[9] The obvious purpose of the benefit cost analysis is to guide watershed development toward the maximization of net value returns over time *within* and *among* watersheds.

The framework for benefit-cost analysis may be outlined in terms of five necessary criteria. Each of these criteria is necessary but no single criterion is sufficient for purposes of making the analysis of benefits and costs, since all criteria are required.

In proceeding with the benefit-cost analysis, determinations and decisions become necessary with respect to feasibility of project, combination of purposes, scale of project, selection of alternative means, and priority of projects. These determinations are largely simultaneous since they involve joint application of the following criteria: benefits exceed costs, each separable purpose (or segment) provides benefits at least equal to its costs, maximum net benefit be realized, most economic of known alternatives be used, and (for priority purposes) the highest benefit cost ratio among watersheds be achieved.[10]

Project Feasibility

Land and water resource development projects have been traditionally and legally defined as being economically feasible if the total benefits

[8] The term "publics" includes all the kinds of governments which may be participants in the watershed firm, such as a city whose water supply is being benefited, or a township or county whose roads and bridges are being protected from flooding, washouts, and sedimentation.

[9] Only those benefits may be included which are solely incident to the specific watershed development resulting from the costs used in the analysis. Obviously, such benefits as general increases in yields or reductions in farming costs stemming from technological and managerial improvements and the adoption of such improvements as well as benefits arising from other programs, that would have occurred had the watershed development not taken place, can not be included in the watershed benefit-cost analysis.

[10] See "Proposed Practices for Economic Analysis for River Basin Projects," Federal Inter-Agency River Basin Committee, Subcommittee on Benefits and Costs, U. S. Govt. Printing Office, Wash., D. C., May, 1950, which includes a general treatment of benefit-cost analysis applied to river basins.

exceed total costs.[11] Obviously, if total benefits do not equal total costs, the maximization objective of watershed development is not attained and consequently more remunerative alternatives should be explored. On the other hand, if total benefits exceed total costs, the first criterion of benefit-cost analysis has been met and the analysis may proceed with the testing of the watershed project in terms of the other necessary criteria.

Combination of Purposes

Numerous purposes may be served in watershed development in terms of prevention of damages and increasing productivity of goods and services. Included in the "prevention of damages" purposes are: reduction of flooding and siltation on farm land; public roads, bridges, and railroads; municipal and other water supply reservoirs, lakes and ponds; industrial, residential and recreational sites; community services including marketing and communication; and reduction of land resource deterioration in the form of gully and severe sheet erosion caused by excessive water run-off. Included in the "increasing productivity of goods and services" purposes are: increasing productivity of agricultural lands; provision of water supplies for stock and irrigation; provision of recreational facilities associated with water retention structures; and provision for fish and wildlife.

Since any two, or all, or many possible combinations of the preceding purposes may be embraced in a particular watershed development, the cost-benefit analysis must ferret out the various purposes and the costs and benefits associated with each. This leads to the application of the second criterion of benefit-cost analysis which stipulates that each separable purpose provide benefits at least equal to its costs. Without application of this criterion, certain purposes might be included which do not yield added benefits equal to their added costs even though the total benefits flowing from the project as a whole do exceed total costs. In such an event, certain supra-marginal purposes must make up the deficit for sub-marginal purposes with the end result of decreased project net benefits.[12]

The violation of this criteria has been noted in the Missouri Basin

[11] This general rule has been used by the Congress as a basis for authorizations and appropriations for flood control, irrigation, and other purposes. This and subsequent tests assume that benefits and costs may be aggregated and expressed in dollar terms. The nature of benefits and costs associated with watershed development are such that they are usually convertible to monetary terms. Exceptions, of course, may be made where benefits or costs not expressible in monetary terms, are deemed sufficient to alter the results of the benefit-cost analysis as developed in this paper.

[12] Sub-marginal refers to those purposes for which the benefit-cost ratio is less than one. Supra-marginal refers to those purposes for which the benefit-cost ratio is greater than one. Marginal refers to purposes which provide a benefit-cost ratio of one to one. Similar meanings are given these terms when applied to projects as well as purposes within projects.

[13] See *Land and Water*, the Report of the Missouri Basin Survey Commission, U. S.

Account concept wherein surplus benefits from hydro-electric power has been used to overcome deficits created by irrigation.[13] The Basin Account concept encourages the inclusion of uneconomic purposes within projects which could not be justified by themselves.

In analyzing combination of purposes, attention must be given to the technical complementarity, independence and competitiveness of purposes. This leads to a correlative criterion that the additional benefits obtained by including a purpose and its joint effects upon benefits from other included purposes, must be greater than the costs of providing these benefits if the particular purpose is omitted from the project and achieved separately.

Certainly, efforts should be made to prevent the development of a "watershed account" concept whereby purposes yielding less benefits than their asociated costs become included and thus reduce total benefits relative to total costs below the project benefit-cost ratio that would exist without the sub-marginal purpose (s).

Determination of Scale

The two previous criteria, namely, that project benefits exceed project costs and that each purpose yield benefits beyond its costs, are essential but insufficient by themselves to meet the maximization objective of watershed development. A third criterion must be added which states that maximum net benefits from a particular project can be attained only if the investments are carried to the point where the marginal benefit equals the marginal cost of the added segment of investment. Beyond this point, net benefits are decreasing since each segment of investment yields less benefits than it costs. Therefore, the additional segments of investment could be used more profitably in other watersheds where investment has not reached this point of diminishing net returns.

In no normal instance, should watershed investments be added beyond the point where the marginal benefits are equal to the marginal costs.[14] In the case of limited funds, however, this optimum point may not be reached since the highest return per unit of investment is achieved by equating the marginal net benefits of all potential watersheds and this equi-marginal benefit point may well be reached prior to the point where marginal benefits equal marginal costs in individual watersheds.

Selection of Alternative Means

Several alternatives may be available for achieving each particular purpose in a watershed development. For example, flood control may be

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[13] Govt. Printing Office, Wash., D.C., 1953. Chapter VI.

[14] One possible exception is the case of otherwise unemployed resources where their alternative uses would yield even less benefits.

achieved by water impounding structures or by terracing and contour farming or by a combination of the two. The choice among alternative technical means will depend upon the benefit-cost relationships of each. The selection of alternative means necessitates the application of a fourth criterion which analyzes the several available technical means in terms of their associated benefits and costs and reveals the means which yields the greatest benefits relative to its costs.

This criterion insists upon the selection of those alternative means and combinations thereof which yield the highest benefits attainable relative to costs. This selection is determined by equating marginal rates of substitution of alternatives to their iso-cost (or iso-outlay) lines of investment.

An interesting example of alternative means yielding differential benefits may be taken from the Little Sioux Watershed Program in Western Iowa. On an annual basis the costs thus far have been estimated at $107,062 and the benefits at $194,937 which represents a benefit of $1.82 for each dollar invested. However, the gully control structure phase of the program yields only $0.89 for each dollar invested while the farmland treatment measures yield $3.00 benefit for each dollar of cost.[15] Although the interdependency between the gully control structures and the land treatment measures was not reported, it would appear that all available funds should have been invested in the land treatment measures to the point where the marginal cost equaled the marginal benefit and no funds should have gone into gully control structures—unless the inter-dependency of measures greatly increased the benefits to gully control structures.

Watershed Priority

So long as any watersheds remain underdeveloped, there remains competition among watersheds for the use of available funds. Watershed priorities are particularly important in light of the large number of watersheds in the country seeking development and the paucity of public funds available for watershed development. This situation leads to the necessity of establishing priority among watersheds in order to assure that the limited available funds may be invested in those watersheds where the benefits are greatest.

In determining watershed priority, the fifth criterion of benefit-cost analysis is applied. This criterion uses the benefit-cost relationships of the competing watersheds and arranges these watersheds in order of priority using the maximum net benefits as the ordering device.[16]

An example of watershed priorities may be taken from the Little Sioux Watershed Program. Of the 12 sub-watersheds scattered throughout the

[15] This data was provided the Missouri Basin Survey Commission by the USDA and is found in the Commission's Report, *op. cit.*, p. 95.

[16] This approach is emphasized in Circular A-47, Bureau of the Budget, 1952, p. 1.

Little Sioux Watershed the average benefit-cost ratio of the programs put into effect in these watersheds is 1.82 to 1.00.[17] However, the benefits for the individual sub-watersheds vary from $0.94 in the Masters to $3.50 in the Black Slough for each one dollar invested. The benefits per dollar of cost in each of the other ten watersheds were $3.10, $2.40, $2.40, $2.30, $2.10, $1.80, $1.70, $1.56, $1.30, and $1.58. The expenditure of funds in the Masters' sub-watershed did not even meet the initial criteria previously presented under project feasibility and consequently should not have been made according to this criteria. The series of benefit-cost ratios for the remaining 11 sub-watersheds provides a basis for establishing priority for activating work in the several watersheds. This ordering assumes that the relative benefit-cost ratios are in the same order as the relative maximum net benefits for each sub-watershed. For example, initial funds should have been invested in the sub-watershed yielding $3.50 benefits for each dollar of cost; additional funds when made available should have gone into the sub-watersheds yielding $2.40 benefits and so on. If funds were used in the sub-watershed yielding $2.40 benefits ahead of the sub-watershed yielding $3.50 and if available funds permitted undertaking only one of the alternative watersheds, then the opportunity cost of each one dollar expended was $1.10.[18] Or, in other words, $1.10 for each initial one dollar was lost through failure to undertake the projects on the basis of the suggested priority.

One serious problem of establishing priorities consists of developing a method of benefit-cost analysis which may be easily and quickly applied to a large number of watersheds seeking priorities. There is no reason why the framework presented in this paper may not be made operationally applicable in resolving this problem. The advantages of such procedure become obvious when viewed in terms of potential benefits from alternative project selection. For example, if this procedure of establishing priorities for watershed development resulted in the selection of a watershed with benefits of $3.00 to one dollar of cost as contrasted to a watershed with benefits of $1.50 to one dollar of cost the savings for each $100,000 available for watershed investment would amount to $150,000. This amount of savings would finance detailed priority studies with considerable funds remaining for additional watershed expenditures.

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[17] These 12 sub-watersheds are non-contiguous and hence do not possess interdependent benefits and costs. They vary in size from 485 to 4,722 acres and altogether comprise 16,447 acres which have been treated under the program at a cost of around $2½ million which is about $150 per acre. These data are taken from the Missouri Basin Survey Commission Report, *op. cit.*, p. 95.

[18] Of course, the Little Sioux Project was conducted on an experimental and demonstrational basis. Hence, there may be sufficient justification in this particular instance from experimental and demonstrational viewpoints for not following the suggested procedures for priorities. This conclusion, however, may be tested in terms of whether or not the demonstrational and experimental values of undertaking the $2.40 benefit

Dissociation and Association Theories of Benefits and Costs

The previous discussion assumes that benefits and costs may be perfectly associated over time at the watershed firm level. This perfect association concept is satisfactory for the benefit cost analysis since no attention need be given to the relative incidences of benefits and costs among and within public and private participants. Thus, the benefit cost analysis is concerned exclusively with the maximization of goods and services for the watershed as a whole. After this objective has been achieved through the application of the five cost-benefit criteria, attention turns to the relative and absolute incidences of the costs and benefits upon the various participants in the watershed development.

If all benefits and costs were perfectly associated for each participant, the problem of cost allocation would be relatively simple since participants receiving benefits would automatically bear the associated costs and participants bearing costs (or damages) would automatically receive compensating benefits. However, this perfect association of benefits and costs is far from being true due to several kinds of possible dissociations.

There are two major factors responsible for dissociation of costs and benefits within the watershed. One factor consists of the shifting of benefits and costs between individuals within a particular time interval (intra- and inter-firm and intra-temporal). The second factor consists of the dissociation of costs and benefits between participants over time (intra- and inter-firm and inter-temporal).

Referring to the first factor, an example of the intra-firm intra-temporal dissociation of benefits and costs is a leasing arrangement which does not distribute benefits and costs equally between the two parties. An example of the inter-farm intra-temporal dissociation may be found in two adjoining farms in which one of the farmers operates his land in such a way as to cause serious flooding and siltation damages to the adjoining farm. Furthermore, the first mentioned farmer could not be expected to make substantial investments because part of the benefits therefrom would accrue to the other farmer.

Referring to the second factor, an example of intra-firm inter-temporal dissociation would be a leasing arrangement of one year in duration without compensation provision. In such a case, the tenant would not be interested in making an investment in seedings, terraces or contour layouts since he would not be assured of getting full benefits from his investments. An example of inter-firm inter-temporal dissociation would be

sub-watershed ahead of the $3.50 benefit sub-watershed exceeded the $1.10 differential in benefits. Also, the actual priority followed may well have been conditioned by cooperation of landowners and farm operators in the respective watersheds in undertaking their part of the program and in guaranteeing adequate maintenance measures. This situation could be tested by the theories of dissociation and association of benefits and costs presented later in this paper.

exploitive farming systems in the upper section of a watershed resulting in the siltation over time of a city water reservoir or drainage ditches in the lower parts of the watershed.

The nature of causes of the various kinds of dissociations suggest the means whereby benefits may be associated with costs and costs with benefits within the watershed.

No matter how reliable and favorable the benefit-cost analysis may be, the dissociation of benefits and costs can defeat the realization of the watershed development. The remedial approach rests on bringing about an association of benefits with costs and costs with benefits among the various participants, (public and private) in the watershed development. Many of these dissociations may be corrected through improved leasing arrangements, credit for land improvements and other adjustments which may be effected within the individual farm firms.[19]

Principles of Compensating Bounties and Burdens

Further approaches to achieving association of benefits and costs at the inter-farm level stem from the application of the principles of compensating bounties and burdens. In applying these principles, watershed development may be regarded as an economic reorganization which in meeting the five criteria of cost-benefit analysis, increases the goods and services being produced over time in the watershed. This economic reorganization is welfare increasing for the watershed as a whole. However, because of the various kinds of dissociations of benefits and costs, some of the participants may be left worse off and others better off as a result of the development. Certain principles of welfare economics directed toward maximizing public welfare may be applied with some necessary modifications to watershed development as a special case of economic reorganization.[20]

As a result of the economic reorganization within watersheds, two possible situations may result. Either the costs and benefits are so distributed that every participant is left better off than before the reorganization. Or,

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[19] For an analysis of factors giving rise to intra-firm dissociations of benefits and costs, see John C. Frey's *Some Obstacles to Erosion Control in Western Iowa.* Iowa Agr. Exp. Res. Bul. No. 391, 1952. For an analysis of means for overcoming these obstacles (dissociations) see Burnell Held's doctoral dissertation "Overcoming Obstacles to Erosion Control in Western Iowa." Iowa State Coll. Libr., 1953.

[20] For the development of the theory of welfare economics which may be adapted to the special case of economic reorganization occasioned by watershed development see: N. Kaldor, "Welfare Propositions in Economics," *Economic Journal,* V:XLIX. 1939. Pp. 549-552. T. de Scitouzsky. "A Note on Welfare Propositions in Economics," *Review of Economic Studies.* Vol. IX. 1941-2. Pp. 77-78. E. J. Mishan, "The Principle of Compensation Reconsidered." *Journal of Political Economy.* V:LX, 1952. Pp. 312-322. M. W. Reder, *Studies in the Theory of Welfare Economics.* Columbia University Press. New York. 1947, particularly Chap. II "The Marginal Conditions of Maximum Welfare."

one or more participants are left worse off while others are made better off. Due to the widespread dissociations of benefits and costs, the former situation may seldom be expected to develop. Consequently, attention will be focused upon the second situation in which one or more participants are left worse off while others are left better off. This situation leads to the use of principles of compensating bounties and burdens to adjust for the results of dissociations of costs and benefits. Thus, (1) compensating bounties would be used to remunerate participants left less well off and (2) compensating burdens would be assessed against beneficiaries to provide the bounties for those damaged by the watershed program.

Through the medium of compensating bounties and burdens, each participant can be made at least as well off as before the watershed program while all participants in the watershed as a whole are left better off following the application of the cost-benefit criteria previously presented.

Fundamentals of Cost Allocation

Allocation of costs of watershed development will, of course, be limited to those participants benefited by the program. The general principle of allocating costs among beneficiaries is that each purpose and each resource contributor should bear a share of the total cost proportionate to the productivity of the contributed resources. Cost allocations may be approached both from (1) purposes and (2) resource contributors.

Application of the criteria previously presented in the cost-benefit analysis, forms the basis for cost allocation among purposes. Consistent with these criteria, an approach known as the "separable cost remaining benefits" method has been developed in connection with multiple purpose river basin developments.[21] This method involves the application of five criteria in the watershed development.

The first criteria of cost allocation is that each purpose be charged with its separable cost which is the difference between the total cost of the watershed development including the purpose under consideration and the total cost of the watershed program without the purpose under consideration. This procedure would be applied until the separable costs of all purposes are determined.

The second criteria is that joint costs be distributed among purposes in proportion to the excess of benefits and the respective separable costs. Joint costs are the difference between total costs and all separable costs. This procedure would be applied until all joint costs are distributed among the several purposes.

The third criteria is that total costs (the sum of separable and allocated

[21] See *Land and Water*. The Report of the Missouri Basin Survey Commission. *op. cit.* Part V. Chap. 5. Also, see "Proposed Practices for Economic Analysis of River Basin Projects." *op. cit.* May, 1950. Pp. 53-56.

joint costs) allocated to each purpose should not exceed the corresponding benefits to each purpose. Neither should the total cost allocated to each purpose be less than its separable cost, unless the sum of the separable costs exceeds the total costs of the project.

The fourth criteria is that costs of providing benefits from each purpose in the watershed development should not exceed the cost of providing equivalent goods and services through other alternative means which are known.

The fifth criteria is that joint costs associated with specific purposes should be treated as joint costs for those purposes rather than be distributed among all purposes.

These criteria for cost allocation among purposes are in keeping with the maximization objective of watershed development. Benefits are used as a basis for cost allocations to each purpose and are limited by the costs of providing equivalent services from the most economic known alternative technical means. In this manner, uneconomic purposes or uneconomic segments of purposes may be further detected and deleted or reduced to the level of their respective costs measured in terms of costs of the most economic alternative know to achieve the particular purpose.

The preceding procedure for cost allocation among purposes provides the foundation for allocating costs among resource contributors limited to those receiving benefits from the watershed development. The following three criteria for allocating costs among beneficiaries are consistent with both the five criteria for cost allocation among purposes and the principles of compensating bounties and burdens necessary to overcome the dissociations of benefits and costs among the several participants in the watershed development.

The first criterion for allocating costs among participants in the watershed development is that costs allocated among the several purposes for each participant should not exceed the corresponding benefit accruing to each participant. Second, the cost allocated to each participant should be no greater than costs of providing similar benefits to the participant by the lowest cost alternative means known. Third, no participant should be left worse off after the development than he was before.

Criteria for Cost Sharing Arrangements

Cost sharing arrangements among all participants in watershed development should serve to encourage application of the foregoing principles and criteria. Such arrangements should implement the criteria of cost-benefit analysis, the association of benefits and costs through the principles of compensating bounties and burdens and the fundamentals of cost allocation among both purposes and participants.

To aid in developing and testing cost sharing arrangements in keeping

with the above principles and criteria, the four following cost sharing criteria are presented.

First, cost sharing arrangements should encourage the maximization of goods and services from the watershed's resources in keeping with a major objective of watershed development and consistent with the criteria for cost-benefit analysis and cost allocation.

Second, cost sharing arrangements should bring about an equitable sharing of costs among all participants in the watershed development in keeping with a major objective of watershed development and consistent with the criteria for cost allocation and the principles of compensating bounties and burdens.

Third, cost sharing arrangements should contain safeguards that measures on private lands will be maintained and continue to provide the benefits expected throughout the watershed over the assumed life of the program.

Fourth, cost sharing arrangements should be developed and put into effect ahead of any investments in the watershed program as safeguards for compensating participants damaged by the program, obtaining funds from beneficiaries for financing the program, and guaranteeing the maintenance of all improvements over the expected life of the project.

Implications for Policy, Education and Research

This framework has important implications for watershed policy, education and research. In respect to policy, public funds for watershed development are limited. Therefore, extreme care must be exercised in using these funds in a manner that will result in maximum net benefits. Also, care must be exercised that the public investments in watersheds will be protected against deterioration, waste and conversion into private profit at public expense. From the public policy viewpoint, care must be exercised in achieving an equitable sharing of costs among all public and private participants in the watershed development program. In light of these policy aspects, the Congress and Federal, State and local agencies and organizations sharing responsibilities for watershed development, might well give serious consideration to including the criteria presented in this paper as basic conditions for the authorization and appropriation of funds and for the development and approval of watershed projects on which available public funds may be used. This recommendation reaffirms and extends recommendations made by the Bureau of the Budget, the Federal Inter-Agency River Basin Committee and the President's Missouri Basin Survey Commission.[22] The future success of the watershed approach to land and water development problems will in large measure be conditioned by the application of the foregoing criteria and recommendations.

[22] *Op. Cit.*

Preceding and accompanying policy development is an urgent need for educational measures designed to encourage an understanding of the criteria for watershed development and their application to the resolution of the main cores of watershed problems encompassing cost-benefits analysis, cost allocation and cost sharing. The numerous unique and difficult problems encountered in watershed development, emphasize the importance of immediate and effective educational efforts.

Both policy and educational aspects of watershed development are dependent upon reliable, adequate and applicable research. Insofar as possible, this research should precede the development of policy and education. Certainly, effective research should accompany current initial watershed projects to detect weaknesses and to develop measures on a continuing basis for improving future watershed programs. As indicated earlier in this paper, watershed research demands close working relationships among social and physical scientists. Physical scientists, particularly agronomists and engineers, are faced with the problems of providing technical relationships and functions of various and alternative kinds of practices, land use and structures upon soil erosion, water run-off and land productivity possibilities. Social scientists, particularly economists, are faced with the problems of analyzing these technical data in terms of benefits and costs, incidences of costs and benefits, cost allocation and cost sharing possibilities.

It is regretted that the current USDA experimental watershed program is allocating only five percent of the available funds for evaluation and these limited funds appear slated for special types of physical evaluation. This situation presents a real challenge and responsibility to the State Agricultural Experiment Stations and the Federal Agricultural Research Service to analyze current watershed developments and to point the way for future improvements. In attempting to meet this challenge and responsibility, the Iowa Agricultural Experiment Station has initiated a watershed research program in which engineers, agronomists and economists have pooled their resources and interests in planning and initiating coordinated studies on a watershed basis.[23] No doubt, other states are undertaking similar studies. In addition, the North Central, Great Plains and Missouri Basin regional research committees are active in encouraging watershed research on inter-state as well as intra-state bases.

The watershed approach is inherently sound and fills a major gap in our land and water development programs. The key to the future success of the watershed approach to land and water development rests largely upon the effectiveness of watershed research, the adequate dissemination of research results and the use of these results by administrative agencies.

[23] Agricultural Experiment Station Project 1266, approved June, 1954, entitled "Physical and Economic Analysis of Watersheds as Related to Soil and Water Conservation."

INSTITUTIONAL ARRANGEMENTS FOR WATERSHED PROGRAMS*

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CONSERVATION of soil and water resources has received a great deal of attention the last two decades. Thus far, however, the emphasis has been on land-treatment measures such as terraces, contour farming, grassed waterways, and farm ponds. Generally, these measures have been accompanied by changes in tillage practices, improved rotations, and use of fertilizers. Another phase of conservation, which has received much less attention until recently, is the reduction of flood damages by building gully-control structures, retarding reservoirs, drainage ditches, stream-bank stabilization works, and other protective devices. These structural controls are designed to reduce soil loss, provide for more orderly runoff of water, and in other ways reduce flood damage.

A watershed-development program, as the term is now used, consists mainly of an acceleration in the adoption of land-treatment measures by landowners, plus construction of soil and water-control structures, the benefits of which are largely off-site. In some situations, watershed development may also include programs for major changes in land use.

Background of Watershed Programs

Although the idea of flood control by watershed programs originated many years ago, its first big impetus came in 1934 with the creation of what later became the Soil Conservation Service. The earliest work of this agency on demonstration projects was organized along watershed lines. For several years, however, the primary emphasis was on the individual farm approach. This was probably necessary in order to develop the local initiative and organization required for a new action program. But as the land-treatment job progressed, more attention was given to the watershed concept.

The Flood Control Act of 1944 authorized USDA to install works of improvement for runoff and water-flow retardation and soil-erosion prevention on 11 rather large watersheds.[1] These projects were to be planned and installed cooperatively with local interests over a long-time period under the direction of the Soil Conservation Service and the Forest Serv-

* Ideas and opinions in this paper are those of the authors and do not necessarily express the views of ARS or other agencies of USDA.

[1] Public Law No. 534, 78th Congress, 2nd session. Act of December 22, 1944. For an early description of this program, see "Agricultural Flood Control Program," by H. H. Wooten, *Journal of Land & Public Utility Economics*, Vol. 22, p. 35, February, 1946.

ice. Work has been carried out by small sub-watersheds within each project area. It is estimated that the 11 projects range from about 20 to 35 percent of completion at the present time.

In 1953, the Congress included $5,000,000 in the 1954 USDA appropriation for "watershed protection." The announced purpose was to provide funds for a cooperative program with local organizations to demonstrate the practicability of complete watershed protection for soil and water conservation, alleviation of flood damage, and reduction of silt problems. Primary responsibility was assigned to the Soil Conservation Service and Forest Service. About 60 small watershed projects in 34 States are being considered under this program. Most of these are still in the planning stage, with construction to be completed over a period of about 5 years. The total cost is estimated at some $60,000,000 of which about half will be borne by the Federal Government and half, by individual landowners, local organizations, and State agencies.[2]

In addition to these specially authorized watershed projects, the Soil Conservation Service has assisted with the planning and construction of several other successful small watershed programs in cooperation with various State and Federal agencies and local landowners, such as the Brown's Canyon project in western Nebraska, the Four Districts Watershed in eastern Iowa, and a large number of water-management projects in various parts of the country. These projects did not require Congressional authorization because all construction funds came from sources other than USDA appropriations, the Soil Conservation Service merely supplying technical and advisory assistance.

The Hope-Aiken Watershed Protection and Flood Prevention Act, recently passed by Congress and approved by the President, emphasizes the idea of local-State-Federal cooperation in watershed programs.[3] In view of the fact that this act may establish policies under which USDA will participate in watershed programs for some years to come, we should say a few words about it:

(1) The Secretary of Agriculture is authorized to assist local organizations in developing plans for works of improvement on a watershed basis upon the approval of the application of a local organization by the authorized State agency (or Governor of the State). If this State agency or official does not disapprove an application within 45 days, the Secretary and the local organization can proceed with the planning work. Presumably, this means that watershed projects are to be initiated by the local people them-

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[2] For a description of this program, see "The Small Watershed Gets Attention," by Erwin C. Ford, *Soil Conservation Magazine*, Vol. XVIII. No. 9, December, 1953, pp. 106-114.

[3] Public Law No. 566, 83rd Congress, 2nd session.

selves and that the States are to provide some degree of coordination among watershed programs within their boundaries.

(2) The small watershed is to be the basic work unit. Each watershed project is not to exceed 250,000 acres in size, although a number of such watersheds which comprise parts of a larger basin may be planned together if the local sponsoring organizations so request.

(3) Structures are to be comparatively small. Those with capacities larger than 5,000 acre-feet are prohibited and all plans which contain structures with capacities of 2,500 to 5,000 acre-feet must be approved by resolution of the Senate and House Committees on Agriculture before appropriations can be made. Structures smaller than 2,500 acre-feet capacity can be built without special Congressional approval.

(4) The local sponsoring organization is to install the structures, generally by contracting with construction firms. In those States where the local organization lacks authority to enter into construction contracts, the Secretary of Agriculture may enter into such contracts, but this authority is to expire on July 1, 1956.

(5) The local organization must acquire all lands and rights-of-way needed for structures, assume an equitable share of the construction cost, arrange for operation and maintenance of structures, secure the necessary water rights, and get agreements to carry out soil conservation practices from the owners of at least half of the lands in the watershed above the structures.

(6) The Hope-Aiken Act does not provide any appropriations nor establish any other limitation on the amount of cooperative watershed-protection work to be undertaken by USDA. Presumably, Congress will make these decisions annually after reviewing the status of the work. The President requested Congress to provide a supplemental appropriation of $3,000,000 for this work during the 1955 fiscal year.

The importance of the structure and functions of local organization in cooperative flood-control programs was not fully appreciated at first. The early USDA flood-control reports, for example, usually did not devote more than one or two paragraphs to the local organizational aspects of proposed programs. Although there is a fairly large and growing body of technical literature on the biological, hydrological, and economic aspects of watershed programs, only a few publications and technical papers are available on organizational aspects.[4]

[4] The more significant of these contributions are: (1) Raymond Carmon and Nick K. Kittrie, "A Comparative Study of Watershed Legislation," Special Rept. No. 28, Bur. of Govt. Res., Uni. of Kan., Lawrence, Kansas, September 1952; (2) Otto H. Liebers, "Local Responsibilities and Organization of Watershed Programs," Salt-Wahoo Watershed Association, Lincoln, Neb. (paper read at meeting of Great Plains Agricultural Council, August 3, 1951); (3) Harry A. Steele, "Some Economic Prob-

The 11 authorized flood-control projects demonstrated the need for adequately empowered local organizations. The Hope-Aiken Act, in attempting to rectify previous shortcomings, places various responsibilities squarely on the local sponsoring organizations. This has stimulated interest in finding answers to such questions as: "What type of local organization is most appropriate?" "What functions should it perform?" "What powers will it need to carry out these functions?" "How should the local organization be financed?" Research is underway on these and similar questions at the Nebraska and the North Dakota Agricultural Experiment Stations in cooperation with the Agricultural Research Service, USDA. A proposal is now being considered by several USDA agencies to expand this type of study.

Functions of the Local Watershed Organization

If a watershed project is to be carried out successfully, the local organization must assume certain responsibilities and perform certain functions. There are both practical and legal reasons for this.

Information and education.—A watershed-protection program, by the very nature of things, is a community-wide venture. A vast majority of the local people must understand the need for the proposed development; otherwise they cannot be expected to regard themselves as part of it and will distrust or even oppose it. An intensive education program is a prerequisite to the informed, active participation of local residents. Each landowner, farmer, and businessman in the watershed continually needs to have current information regarding project plans and programs in order to plan his own affairs accordingly.

Negotiating agreements with landowners to carry out watershed measures, including soil-conservation practices on lands above structures, is made a local function by the Hope-Aiken Act. Preparation for such negotiations is part of the educational process. The local organization must assume responsibility for a major share of the promotional and educational work, because people naturally tend to look to their own local leaders. Moreover, the educational work is a big job—too big for the limited personnel USDA is able to assign to each project to do even if they wanted to take on this function. In a little watershed project in North

lems of Local Organization for Watershed Programs in the Missouri Basin," Bureau of Agricultural Economics, USDA (paper read at meeting of Great Plains Agricultural Council, August 3, 1951); (4) Stanley Voelker, Giles H. Penstone, Kris Kristjanson and John Muehlbeier, "Local Organization for Participation in Water-Development Projects and Watershed Programs," mimeographed report prepared by Bur. Agri. Econ. and Solicitor's Office, USDA, at the request of the Missouri Basin Survey Commission, August 1952; and (5) John Muehlbeier, "Watershed Districts for Local Participation in Resource Programs," Bur. Agri. Econ., USDA (paper read at meeting of Missouri Basin Inter-Agency Committee, January 28, 1953).

Dakota, for example, soil conservation district supervisors and the county extension agent conducted 40 community meetings during a few weeks last winter prior to the adoption of the final watershed plan. In addition, they prepared news releases, announcements, and posters; arranged tours over the project area; and conducted conservation contests among local schools. SCS technicians assisted in the preparation of materials used in this educational effort and were present at some of the meetings to help answer questions raised by local people. But the key to the success of the educational effort was the fact that the county agent and local leadership knew when, where, and how to hold community meetings.

Planning and surveys.—Project planning is frequently regarded as the prerogative of engineers and other technicians. Nevertheless, the local organization can and should contribute to the planning process. Surveying and planning are expensive and time-consuming processes that can be greatly facilitated by local participation. Much information must be obtained from local residents and their interested cooperation should reduce the time and expense of surveys. Of even more importance, they will feel that they have a part in the plan.

Often there is controversy as to the type of program that should be undertaken, not only because of a lack of facts about the situation, but also because of differences in opinion and in the interpretation of available data. Technicians sometimes are tempted to present a single development plan to the local people, with no indication that possible alternatives were fully explored and adequately evaluated. In some cases, it may be desirable for the local organization to hire its own technicians and consultants to review possible alternatives.

The local organization and its governing board can provide the focal point at which the technicians' plan can be adjusted to meet the desires and ideas of local people. The watershed project, mentioned previously, provides a good illustration of this process. The automatic outlet works of the 18 water-detention dams proposed for this project were originally designed by SCS to release flood impoundments over a 20-day period. Local people, with vivid memories of dry stream beds during the droughts of the 1930's, requested that 50 percent of the impoundments be released during the 20-day period and the other 50 percent, over a 5 months' period. To meet this request, SCS redesigned the outlet works, but the assurance of perennial streams below the dams is of considerable importance to farmers depending upon these streams for stockwater.

Construction and installation of structures.—For projects constructed under both the 1954 watershed-protection program and the Hope-Aiken Act, the local organization must obtain all lands and rights-of-way needed for reservoirs, ditches, dikes, and other major flood-control structures.

Landowners sometimes become quite resentful when a Federal agency attempts to secure private property for public purposes. Usually, a local organization can obtain rights-of-way from private landowners at lower cost and with fewer condemnation proceedings than can a Federal agency.

The Hope-Aiken Act requires the local organization to assume responsibility for letting construction contracts for installing structures. In most instances, USDA engineers will assist with the preparation of plans and specifications upon which bidding and contracts will be based. In many States, letting construction contracts will be a new function for local conservation organizations and this may occasion some delay and confusion at first. In other States, however, little difficulty is anticipated—adequate statutory provisions are in effect and local officials and the construction industry have become familiar with the required procedures in connection with small drainage and water-disposal projects.

Operation and maintenance of structures.—The quality of maintenance work is extremely important, because the major test of a watershed program in terms of flood control may not come until years after installation. Moreover, deferred maintenance may result in deterioration of structures and eventual high costs for rehabilitation or replacement.

Under the earlier USDA watershed programs, it was implied that local organizations would assume responsibility for operation and maintenance of constructed works. This has been a troublesome aspect of the program on some projects. The Hope-Aiken Act undertakes to prevent such situations from arising by requiring firm commitments for future maintenance by local organization prior to approval of USDA's participation in the project. If the local organization has the necessary financial ability, negotiating a maintenance agreement should not pose any serious problem, providing the agreement is signed before the structures are built. One procedure estabished in some of the current agreements is a periodic inspection of the structures jointly by USDA technicians and officials of the sponsoring organization, after which a schedule of the amount, kind, and timing of needed maintenance work is agreed upon. The local organization then performs the work, either with its own equipment and employees or by contracting with other agencies or private firms.

Financing.—The financial functions of local organizations are of crucial importance, because they involve answering such basic questions as "Who pays for what?" The history of other types of local resource-development enterprises—irrigation, drainage and levee projects—over the past 50 years indicates that a local organization is more apt to fall down in the performance of financial functions than in carrying out others.

A watershed organization will need funds for various purposes. It may

have to pay certain organizational costs for public hearings, legal fees, travel expense of its officers, and publishing legal notices. After its program reaches the construction and operational stages, it may have some administration and overhead expenses. Although neither the initial organizational expense nor the administrative overhead are expected to be large, it makes it much easier for such an organization to initiate and carry out its program if funds are definitely made available for these purposes.

The construction of water-retarding dams, gully-control structures, ditches, and other protective works call for large investments by both the local organization and the Federal Government. Under the 1954 Watershed Protection program, the objective was to have local organizations bear 50 percent of the cost of the program as a whole, taken on a national, over-all basis. An administrative interpretation of this requirement permitted the local organization to be credited with certain amounts it had spent previously for watershed protection and flood-control purposes in the computation of the shares of the new construction cost to be borne by the local organization and the Federal Government. There is some danger of such a provision being abused to the point where it practically nullifies the 50-50 cost-sharing idea, with the result that the Federal Government carries nearly all of the new construction cost.

The Hope-Aiken Act does not establish any cost-sharing formula. Instead it requires that the local organization shall provide the necessary land and rights-of-way for the improvement works and shall "assume such proportionate share of the cost of installing any works of improvement involving Federal assistance as may be determined by the Secretary [of Agriculture] to be equitable in consideration of anticipated benefits from such improvements."[5] This provision is capable of a variety of interpretations. About all that can be said definitely at this time is that USDA has been given the responsibility of working out cost-sharing arrangements with the local organization on each project, that the Federal contribution may vary from one project to another, and that in most cases the local share probably will have to be quite substantial.

It would seem then, that the local organization needs to have the financial ability to raise large sums of money for construction purposes. If the construction work is done over a period of several years, the local organization may be able to finance its share of the cost out of annual revenues. On the other hand, if the work is to be done during a relatively short period, the local organization should be empowered to incur

[5] Public Law No. 566, 83rd Congress, 2nd session, sec. 4.

indebtedness, that is, to register its warrants or to sell bonds.

Another cost which the local organization will have to be prepared to meet is annual maintenance expense. In the past, enabling acts under which many improvement programs were organized were extremely faulty in that they failed to provide local organization with adequate funds for maintenance.

In addition to regular annual maintenance, the local organization probably should be prepared to replace certain structures of the watershed program which have served their useful life or have been severely damaged. Hence, it may be desirable to authorize the establishment of sinking funds for replacements out of current revenues.

Where is the local organization going to get the money needed for all of these purposes? In most cases, it will have to depend primarily on either general property taxes levied against all property within its boundaries or on special assessments levied against benefited properties, or a combination of both taxes and special assessments. It may receive some income from other sources, such as rentals on its equipment, sale of water, or lease of recreational sites, but these are not likely to be very large.

Use of general property taxes can be justified to the extent that the watershed program does benefit all property owners. The program, for example, may help protect roads, bridges, or other public property, the maintenance and replacement costs of which must be covered by local property taxes. Also, the program may provide other and more general benefits to the community. Special assessments, on the other hand, may be more appropriate where benefits to individual properties can be identified. To depend entirely on general property taxes in such a situation would enhance the value of certain lands at the expense of other taxpayers. Some combination of general property taxes and special assessments possibly will prove to be the most equitable arrangement. In a given situation, for example, the local people may decide to pay organizational, overhead, and annual maintenance costs out of general property taxes, and to finance the local share of construction and replacement costs by special assessments against benefited properties. In other watersheds a different combination may be more appropriate. The point is that the local organization needs to be given the power to meet a wide range of conditions in developing financial plans which are acceptable and seem equitable to the local people.

Regulatory functions.—A watershed organization can do a great deal toward getting proper land use through educational work. It can also enter into agreements with landowners, which stipulate what conservation measures will be applied and maintained on the land. Usually these

voluntary methods would be expected to work out satisfactorily without need for resort to regulatory powers. Once in a while, however, some landowner may adhere to practices which damage not only his own land, but also that of his neighbors; the local organization may not wish to delay its program indefinitely awaiting compliance. It could also happen that a new landowner may decide to discontinue land-use and conservation practices agreed to by the previous owner and thus jeopardize the life of a costly structure already built. To meet these problems, local people could protect their investment in structures from the damaging effect of improper land use if they were enabled to adopt and enforce land-use regulations. Some regulations may prohibit certain practices which aggravate soil erosion, while others may require landowners to follow certain practices deemed necessary to reduce or prevent erosion.

The local organization may be able to reduce flood damage on flood plains through use of zoning ordinances. Regulations could be imposed on use of land, use or construction of buildings, density of population, and the like. Non-conforming uses which exist at the time the ordinance is adopted could be continued. New uses considered contrary to the public interest would be prevented. The ordinance thus could give direction to the orderly development of flood plains and thereby reduce the amount of flood damage. Several zoning ordinances now in effect relate to flood-plain use.

Coordination of effort.—A watershed program requires the cooperation of a number of State and Federal agencies. This is recognized by the Hope-Aiken Act, which contains several provisions relating specifically to inter-agency cooperation.

The local organization occupies a strategic position in that it can provide the focus toward which programs of various State and Federal agencies are pointed. The local organization, in addition to its basic agreements with USDA, may have agreements with several other agencies for segments of the total program. For example, it may enter into cooperative agreements with the U. S. Geological Survey for installation of stream-flow gaging stations or with the U. S. Weather Bureau for precipitation gages. Where a township road or county bridge must be abandoned or relocated, the local organization can negotiate the necessary agreements with appropriate local governmental officials.

The variety of governmental agencies involved in a watershed program is indicated by the list of agency representatives in attendance at a recent meeting in North Dakota to go over the final plans for a local project: Flood Control District Board of Commissioners, Boards of Supervisors of three soil conservation districts, Boards of County Commissioners of two counties, Boards of County Drain Commissioners of

two counties, Agricultural Extension Service of two counties, State Water Conservation Commission, State Game and Fish Department, State School of Forestry, State Agricultural Experiment Station, U. S. Soil Conservation Service, U. S. Forest Service, two county Agricultural Stabilization and Conservation Committees, Corps of Army Engineers, U. S. Geological Survey, and U. S. Fish and Wildlife Service. Each of these agencies had participated in the planning process and most of them were being asked to contribute to the program or to make adjustments in their own programs to facilitate the work of the watershed project.

Types of Local Organization on Existing Watershed Projects

In each of the 11 authorized flood-control projects, USDA has had the cooperation of some type of local organization. In most cases USDA entered into basic agreements with soil conservation districts for developing individual farm plans and carrying out educational functions. Inasmuch as there were several districts in each project area, the activities of the various districts sometimes were coordinated by formation of watershed committees, composed of representatives from each board of supervisors, either with or without representation from other agencies. Voluntary flood-control associations assisted in various phases of the program on some projects, particularly in educational and promotional work. In several projects, USDA was able to cooperate with other local governmental units, such as flood-control districts and water conservation districts. In Iowa, counties are authorized to participate in the construction and maintenance of structures, and one county has already done so.

It would have been desirable to have had local organizations with adequate powers to perform all the functions previously discussed, but this was not possible on most projects. The two California projects possibly are an exception to this generalization, because county flood-control districts in that State apparently do have most of the needed powers.

We do not know how many of the 60 projects in the 1954 watershed protection program are favored by adequately empowered local organizations, but the number is believed to be small. Only a few States—including California, Kansas, Michigan, Nebraska, North Dakota, and Ohio—have adopted enabling acts under which watershed districts of one type or another may be organized. Nor are we informed as to how adequate these enabling laws are for the job at hand.

Need for Additional Enabling Legislation

Experience with the 11 flood-control projects and the 60 watershed-protection projects indicates that additional legislation is needed in most States to facilitate cooperation on Hope-Aiken projects. The ques-

tion which immediately arises is whether to amend present enabling acts to grant the necessary powers to existing districts or to enact enabling legislation for an entirely new type of district.

Advocates of the first approach have suggested that the soil conservation district be made the local organization for cooperative watershed programs. These districts are actively going organizations; they cover a very high proportion of the area of most States; USDA has an established policy of cooperating with them, built up over the past 17 years; and this type of district has proved to be an effective organization for carrying out some of the local functions of a watershed program, particularly promotion, education, and obtaining agreements with landowners for conservation practices. On the other hand, most soil conservation districts have not been organized along watershed lines; their boundaries more often than not follow county or township lines and cut across watershed boundaries. A tremendous amount of reorganization work would have to be done if soil conservation districts are to become the sole local sponsoring organization for Hope-Aiken projects.

Moreover, the soil conservation district lacks the financial powers needed for watershed programs. Only two States have given their districts any powers of taxation, and even in these cases the powers granted apparently are too limited for watershed programs. An attempt to amend enabling acts to grant soil conservation districts adequate financial powers may have to face considerable opposition. A certain amount of support for the status quo can be anticipated. Landowners and supervisors of districts not immediately concerned with watershed programs may oppose any effort to change the enabling act. Similar problems would have to be faced if enabling acts for drainage districts or other types of resource-development districts were to be amended to include watershed-program functions. Sometimes it is easier to enact an entirely new enabling law than to amend an act on which the existing institutional complex is based.

Another possibility would be for the soil conservation districts to co-sponsor watershed projects with other local organizations that do have the requisite powers. The co-sponsorship approach is based on the fact that the various functions which local organizations must perform in cooperative watershed programs do not necessarily have to be lodged in only one type of district on each project. Existing governmental units—such as the county government, soil conservation district, irrigation district, and drainage organization—could be left with those functions and programs which they now have and a watershed district could be created to perform those functions necessary to the over-all pro-

gram which other local units are not authorized to perform. Co-sponsorship, thus, may be the most practical solution in many situations. Its chief disadvantages are that it adds to the complexity of local government and might result in conflicts and some duplication of effort.

The co-sponsorship approach is not entirely new. The Tongue River Watershed Protection Project in North Dakota is being co-sponsored by a water conservation and flood-control district and three soil conservation districts. The North Dakota enabling legislation grants unusually broad powers to water conservation and flood control districts. Such a district has the legal authority to do practically everything that county drain boards and soil conservation districts can do—except enact land-use regulations—and in addition has much broader financial powers. The governing body of this particular district, however, consistently has followed a policy of refraining from activities and functions being carried on by other local governmental units. Co-sponsorship in this situation, thus, is actually a means for reducing duplication of effort.

Enabling Legislation for Watershed Districts

Time does not permit discussion of the details of an adequate State enabling act for watershed districts, but a general description may not be out of place. The act should confer rather broad powers on the districts to plan and carry out projects in the fields of soil and water conservation, flood control, silt and pollution abatement, channel improvement, drainage, water disposal, forestation, watershed management, and others. The district would have to have the general corporate powers of local government: To sue and be sued in its corporate name, to buy and dispose of real estate and personal property, to hire and discharge employees, to exercise the right of eminent domain, to enter into agreements with other governmental agencies, to contract with private firms, and to accept gifts and contributions.

The procedure for formation of watershed districts should be simple and convenient, possibly without the necessity for a local election on the question. The governing body of the district needs to be given rather broad discretionary powers to make decisions, but matters which could affect local property owners adversely should be made subject to approval of the electorate or to the veto of a majority of property owners signing protest petitions.

The financial powers of the district should be described in considerable detail. As indicated previously, it may be desirable to give the district the power to levy both general property taxes and special assessments and to exercise some latitude in developing its own particular financial

plan. But these powers cannot be unlimited. The legislature may wish to set maximum property-tax rates and establish appropriate procedures to assure landowners that special assessments are equitable and based on adequate appraisals of benefits. Detailed procedures should be established under which the district may issue debt obligations and enter into repayment contracts with State or Federal agencies. Assumption of debt probably should be subject to the approval of the electorate. Standards for accounting and periodic audits might be desirable.

The watershed district could be granted certain regulatory powers by a delegation of police power from the State. These might include regulation of stream flow and reservoir operations within its boundaries. If the county or township government does not have authority to enact zoning ordinances, or if the soil conservation district does not have authority to adopt land-use regulations, these powers could be conferred on the watershed district.

State-District Relations in Watershed Programs

The Hope-Aiken Act recognizes that each State should have the authority to exercise some control over local watershed programs, if it so desires. The State legislatures, therefore, need to consider the question of district-State relations.

The organization of a watershed district requires decision on the area to be included. Local people must take the initiative and indicate the boundaries they would like to establish. It may be desirable, however, for the State to determine whether organization of the district would be in the public interest and whether the proposed boundaries would permit development of an effective program. There may be situations, for example, where the inclusion or exclusion of certain lands would result in a better program. Then, too, the program proposed in one district may affect another district adversely or damage adjoining property outside the district. Such situations have arisen in the past in the case of drainage and other improvement districts; they could occur with watershed programs. State approval of districts prior to organization and State review of district programs may result in better programs from the viewpoint of both the local community and the State as a whole.

The job of participation in watershed programs at the State level could be assigned to some official, such as the State engineer, or to some agency, such as a resources board or water commission. The important thing would seem to be that funds and personnel are provided so that whatever office is given the assignment can handle the extra work. Too often extra assignments are made without additional funds being provided.

DISCUSSION

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The subject of watershed protection dealt with in these two papers is one of great current importance to agriculture and of widespread interest throughout the nation.

A significant addition to national water resources policy was recognized by law when President Eisenhower on August 4, 1954 signed the Watershed Protection and Flood Prevention Act (Hope-Aiken Act). In commenting on the Act the President said, "This legislation is significant because it gives new stimulus to local initiative and establishes for the first time a nationwide program of conservaton practices based on the concept that farms, streams, forests, and towns are all inter-related parts of a watershed. It recognizes in practical terms that the upstream part of the watershed, as well as the downstream part, must be taken into our plans if we are to have the water we vitally need and if we are to solve with maximum effectiveness three of our most challenging problems—soil erosion, floods and drought."

Basically the Act provides for the first time the basis for local watershed groups to cooperate with and receive assistance from the Federal government in solving the flood prevention and water management problems in small upstream watersheds. It authorizes the Secretary of Agriculture to cooperate with States and local agencies in carrying out jointly planned and mutually agreed upon flood prevention and water management projects.

The paper by Voelker and Muehlbeier sets out a number of the more important responsibilities to be carried out by local organizations if they are to do their share in making Federal-State-local cooperation fully workable. The authors deserve much credit for the clear and concise manner in which they have presented a comprehensive statement of the many complex and interrelated arrangements that need to be considered and worked out. My remarks should be considered only as supplementary to this fine paper.

A very large part of the paper emphasizes structures. This is understandable considering that watershed programs offer the opportunity to combine the effectiveness of structures with land treatment measures in bringing about Watershed Protection and Flood Prevention. Nevertheless, I feel prompted to draw attention to the soil conservation measures in order to suggest a more balanced perspective of watershed programs. In most watersheds, the efforts of the individual farmers and ranchers to plan and establish land treatment measures on their land will constitute a large part of the total efforts of all parties including individuals, legal entities of a State, the State itself and the Federal government. The importance of this contribution of individual farm conservation planning cannot be overlooked because it actually is the foundation on which a complete watershed program must rest. Yet this contribution alone is not enough, except in a few rare instances, to achieve the goals of Watershed Protection and Flood Prevention. Similarly, the contribution of structural measures alone is not enough. Only when the efforts of all affected parties are joined to establish land treatment measures and to install structures in proper relationships of function and timing can the whole watershed program be completed and made effective.

Specifically with regard to institutional arrangements, the paper points out, in general, the manner in which local cooperation is being carried forward now. The soil conservation districts are carrying most or all of the local responsibility, supported or supplemented in a few States by other kinds of legal entities of State. The paper ably describes this situation in North Dakota, one of the relatively few States in which local cooperation is provided for at State and county governmental levels and, in addition, through efforts by locally organized Soil conservation districts and water conservation and flood control districts which are legal entities of State. As pointed out in the paper, a number of other States are equipped with legislation to handle local responsibility generally similar to the ways in which it is being carried out in North Dakota.

It seems appropriate to point out some plans underway to help explore what would be an adequate legislative basis for Federal-State-local cooperation. First, we think it is desirable to arrange with the States to arrive at an understanding regarding the adequacy of existing enabling legislation as a basis for cooperation. This would involve, among other things, an inventory of State laws, the setting forth of basic considerations for cooperation, and understanding as to the needs for cooperation. We are sure that appropriate understanding and action to provide for institutional arrangements for watershed programs will be forthcoming.

John Timmons has made a useful delineation of watershed problems by pointing out that they are the land and water problems that fall between the farm and the river basin.

It is quite true, as he points out, that there has been a gap between the individual farm and the river basin approaches to land and water resource conservation. Furthermore, new national policy, expressed in the Watershed Protection and Flood Prevention Act and expressed by action of State legislatures and local interests, is in the direction of closing that gap.

It seems to me that Timmons instead of stating "3 important and interrelated objectives" of watershed development, has actually stated one major objective and two major sets of guiding principles that should be used to assure equitable allocation and sharing of costs of watershed development.

This appears to me to be a minor criticism since his paper makes a good case for following out the guiding principles of cost-benefit analysis for project feasibility, the fundamentals of cost allocation and criteria for equitable cost sharing arrangements.

The real objectives of watershed development that have given rise to the rather recent and widespread interest in this kind of program are well stated later on in the paper under the heading "Combination of Purposes." Prevention of damages from water and sediment and increased productivity from improved uses of land and water resources are objectives toward which combined public and private efforts are directed in the watershed programs.

The watershed as a working unit for land and water resource conservation and development has been advocated by technicians for many years. As a matter of fact there was much argument in favor of forming soil conservation districts on a watershed basis rather than a county basis almost two decades ago. The significant aspect of the present widespread interest in watershed protection is that it has grown solidly out of the observation and experiences of farmers and rural communities where soil conservation has been practiced longest. They have seen how it is possible to manage surface water on their

own fields and woodlots to reduce its damaging effects and to increase its infiltration into the soil. They have seen the effects of land treatment on the behavior of small creeks and streams. From these first hand observations have grown convictions that more could be accomplished if all land owners and operators in a watershed would approach the problem together.

At the same time this experience was being gained by farmers and rural communities, some major efforts were being directed toward river basin planning in the Tennessee, Missouri, Columbia, Arkansas-White-Red, and New England-New York river basins. As Timmons points out, this experience also contributed to the realization that there are definite limitations to river basin planning unless adequate consideration is also given to watershed planning.

Timmons correctly points out in his conclusions that public funds for resource development are limited and must therefore be used to maximize net benefits. The equitable sharing of costs among all public and private participants in the watershed program is certain to continue to be a difficult problem. How well it is done will in a large measure determine the usefulness of the program.

It is encouraging indeed to know that the Iowa Agricultural Experiment Station has initiated a watershed research program. Timmons' final conclusion that the key to the future success of the watershed approach to land and water resource development rests largely on the effectiveness of watershed research and how well it is used by administrative agencies is a challenge to researchers as much as to administrators. Both must find a way to keep close to the practical needs and capacities of land owners and operators who must carry the lion's share of the job in the watersheds.

Another very important factor in the success of land and water resources development, whether in small watersheds or river basins, rests on the success with which competitive uses of water and land can be compromised by special interest users who find themselves in direct conflict with each other. Neither the researcher nor the administrator can settle these conflicts, but both must expect to work in an environment where increasing competition for uses of land and water continue to give rise to conflicts.

FARM CREDIT

A RE-EXAMINATION OF THE CREDIT NEEDS OF AGRICULTURE*

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THE financial condition of the agricultural plant of this country, in the aggregate, is still extremely solvent. In no pre-war period since 1920 was the industry's financial health as strong as from 1947 through 1953. Certainly, few of the credit obstacles anticipated at the close of World War II have yet developed, although there are indications that some are now on the horizon.

Just what has happened to the agricultural plant since 1940? Assets tripled in value between 1940 and 1954, rising from $53.9 billion to $159.8 billion.[1] Farm indebtedness increased only 70 percent, rising from $10 billion to $17.1 billion. The Balance Sheet of U.S. Agriculture has some serious limitations if used for comparative purposes.[2] Even so, it is useful for comparing agriculture with other segments of the economy and to indicate the extent and trends of capital formation taking place in agriculture over time. It is in this latter respect that the balance sheet is of real value to us in appraising the changing credit needs.

A closer look at the changing asset structure during the past 14 years indicates the declining importance of farm real estate relative to other assets (Table 1). During this short span of years, real estate declined from two-thirds of the total asset structure to less than 60 percent of the value of all assets. The value of non-real estate items and financial assets made up an increasing part of the total. All of the relative increase in non-real estate items resulted from larger quantities of farm machinery and motor vehicles on farms. Where machinery made up 6.5 percent of the total in 1940, it had increased to 12.5 percent by 1954. The value of livestock and crops on farms decreased slightly in relative importance during this same period. Note, then, that this increase in non-real estate items has developed, for the most part, in capital goods with a productive life much in excess of one year. Along with this, there are many real estate improvements which appear under real estate values that are of much the same nature as these intermediate type capital assets—building improvements, new fence, tile, lime applications, and the like. There has been a relatively

* The author is indebted to John W. Hicks and E. C. Young for their critical analysis as this paper was written.

[1] Comparative Balance Sheet of Agriculture, United States, Agricultural Research Service, U.S.D.A.

[2] For an excellent statement of its limitations see R. J. Burroughs, "Uses and Misuses of the Balance Sheet of Agriculture," *Agricultural Finance Review*, Vol. 12, Nov. 1949, page 22.

rapid trend toward intermediate type capital assets in the farming picture. This is asserting itself in the overall credit picture.

The relative importance of real estate and non-real estate indebtedness is much less than in 1940. The net worth of agriculture increased from just under 80 percent of the value of total assets in 1940 to more than 88 percent in 1954. The decline in indebtedness was most striking in the case of farm mortgage credit, diminishing from more than 13 percent of the value of total assets to approximately 5 percent by 1954. In 1940, total farm

TABLE 1. DISTRIBUTION OF FARM ASSETS AND LIABILITIES, UNITED STATES, JANUARY 1, 1940 AND 1954[a]

Item	1940	1954	Change 1940–54	
			Absolute	Relative
Assets[b]				
Real estate	67.7%	58.7%	−9.0%	−13.3%
Non-real estate	22.2	26.6	+4.4	+19.8
Machinery and motor vehicles	6.5	12.5	+6.0	+92.3
Livestock and crops	15.7	14.1	−1.6	−10.2
Financial	10.1	14.7	+4.6	+45.5
Liabilities				
Real estate debt	13.3%	5.2%	−8.1%	−60.9%
Non-real estate debt	6.1	4.7	−1.4	−23.0
CCC loans and guarantees	.8	1.6	+ .8	+100.0
Net worth	79.8	88.5	+7.7	+10.9

[a] Balance Sheet of U. S. Agriculture, ARS, USDA.
[b] Household goods and furnishings excluded.

mortgage debt was twice the non-real estate debt held by principal institutions and others. Since then, there has been a rapid increase in non-real estate indebtedness relative to farm mortgage debt. By 1951, non-real estate debt, held by institutions and others, exceeded the farm real estate debt outstanding. This situation continued until 1953. The January 1, 1954 Balance Sheet estimates real estate indebtedness of $7.7 billion as compared with non-real estate debt, excluding that held or guaranteed by the CCC, of $7.0 billions. This trend toward more non-real estate indebtedness is undoubtedly a permanent one resulting from the changed asset structure. Certainly, part of the short term indebtedness in recent years has been, and more may be, refinanced through farm mortgage indebtedness in times of lower farm earnings, but there is absolutely nothing currently in the picture that would give rise to a rapid refinancing such as followed World War I. If anything, we should expect a continuation of the trend toward more non-real estate debt. The important thing to note at this point is that debts included under the category of non-real estate are of a significantly different nature than those in this category during the 1920's and 1930's.

With these basic data before us, we may next logically ask the question, what gaps exist in the agricultural credit market? Are the problems associated with short, intermediate or long term credit? What are the peculiar problems associated with getting started farming and what is the role of credit in easing them? In view of the increased commercialization and specialization, have credit practices adjusted to the situation? Has the commercial farm firm reached a point where lenders should begin financing the farm instead of financing land, machinery, feeder cattle, broilers and the like? It is the purpose of this paper to look into these questions under the following major categories: (1) gaps in current credit practices; (2) problems in getting started farming; and (3) financing commercial agriculture.

In this examination of credit needs, certain considerations must be excluded for lack of time. Impediments to credit use arising from farmers attitudes or actions such as risk aversion, lack of knowledge or ability, consumption versus investment preference, and values with respect to capital accumulation, which in many cases are more important than credit availability and terms, are excluded.[3] Second, the credit aspects of the low income farm problem are excluded since such analysis must be made more on the basis of welfare rather than production efficiency.

Gaps in Current Credit Practices

Type of credit will be the basis of analysis at this point, since the farm credit problem is generally considered in terms of various uses of credit. Using the conventional short, intermediate and long term breakdown for types of credit, short term will include that used for operating expenses. Intermediate term credit will include that used for purchase of assets that have a productive life in excess of one year such as machinery, breeding stock, land improvements, building improvements and the like. In terms of the type of property being financed, short term credit is generally associated with non-real estate items and long term credit with farm real estate. The intermediate term credit category, therefore, overlaps into both areas.

Short Term Operating Credit

What progress has been made with the two perennial problems associated with operating loans—terms that are too short and high collateral requirements? Lenders have expanded the use of budgeted loans which match repayments with estimated income dates and note terms based more

[3] For some insight on the magnitude of these impediments, see Earl O. Heady and Earl R. Swanson, *Resource Productivity in Iowa Farming*, Iowa Research Bulletin No. 388, June, 1952.

nearly on income capacity. Collateral security has by no means been subjugated to a minor role. In fact, chattel mortgages are more commonly used even for farm operating needs. The stigma attached to a chattel mortgage has pretty much been erased during the past decade as lenders have again educated farmers to its use. This instrument helps insure that one lender will handle all the borrower's operating credit needs. Where this is the purpose, lenders are doing both the borrower and themselves a service as long as they meet the profitable farm operating expense needs.

Despite the continued increase in cash operating costs relative to total farm income during the past several decades, there are probably fewer inherent problems in this type of credit than either the intermediate or long term areas. Although inadequate note terms and high collateral ratios are still common problems in some areas, much progress has been made. Continued emphasis on these two points will serve to strengthen the loan portfolios of lenders and to give farmers a firmer economic basis on which to plan their farm operating needs.

Intermediate Term Credit[4]

More can be done to increase the productivity of agriculture with credit in this area than in any other. Yet, this continues to be the "blindspot" in the agricultural credit market. Critical gaps include the amount and continuity of the investment program needed to yield results, as well as the nature and terms of the credit program needed. Since the success of intermediate credit programs is tied more closely to increases in productivity than other types of credit, lenders generally have been slow to adapt their loan programs to meet the situation.

The intermediate term credit problem can be subdivided into several categories. For purposes of this discussion, it is differentiated as follows: (1) that needed by owner-operators for improvement, adjustment or expansion programs; (2) that needed by tenants of which a major portion such as breeding stock and real estate improvements involve a tenure oriented problem; and (3) that needed by young farmers getting established in farming. The emphasis at this point will be on the owner-operator improvement programs.

What investment is necessary in an improvement program designed to increase efficiency, to change enterprise combination or to expand size of business? It is not uncommon for improvement expenditures to exceed the

[4] This section is based largely on the findings of two cooperative studies with the Farm Credit Administration during the past three years reported in the following Purdue University Ph.D. theses: L. E. Kreider, "Types of Credit Required to Facilitate Needed Adjustments in American Agriculture," August, 1953; and J. H. Atkinson, "Financing Agricultural Production Adjustments in the Southern Piedmont," August, 1954.

initial investment in real and non-real estate assets. A study of 54 such improvement programs in four states in 1952 indicated that improvement expenditures over a 7-year period averaged three-fourths of the initial investment in the entire farm business. The cost of real estate improvements averaged 70 percent of the original investment in real estate, and investments in non-real estate assets amounted to nearly 90 percent of the original investment in this type of property.

What continuity is needed in such a program? The ordinary sequence of investment in an improvement program generally causes greatest credit needs to occur sometime after the initiation of the adjustment. In addition, the loan commitment remains relatively unchanged for several years if a major change in enterprise combination is initiated.

Since many of the beginning investments are fixed, the program usually must be completed in order to yield expected net returns. For example, in moving from cash crop to cash crop-dairy program, as has been quite common in the Southern Piedmont in recent years, the pasture must be established and the dairy barns and other equipment must be ready before the cows are purchased and milk can be sold. This cycle generally involves a number of years, and the soundness of the loan is tied closely to the lender's ability to judge the potential management ability of the farmer with the new enterprise. In most instances, the operator must move into the new situation slowly in order to gain experience. Many improvement programs are merely a matter of doubling or tripling the present size of an enterprise in order to increase efficiency of production. Here, the necessary experience has already been obtained and the program can be completed much more quickly.

Net returns resulting from improvement programs are often expected to be quite high (Table 2). It was not at all uncommon for the farmers to anticipate net incomes to more than double by the time the program had been completed. Based on estimates of some 56 farmers who were completing a 7-year improvement program in Georgia, Indiana, Kentucky and Nebraska, an average increase of more than 80 percent in net income was expected by the time the program was completed. Undoubtedly, most operators would not have started their programs had they not expected fairly substantial increases in net returns for their efforts.

An essential element of this type lending program is gearing repayment programs to repayment capacity. Most programs must be carefully budgeted in order to estimate the income dates and amounts. Income must be balanced against the continuation of investment expenditures that follow a logical sequence. There has been much discussion in recent years that a 5-year investment program should be covered by a 5-year note or a 7-year investment program by a 7-year note. However, owner-operators,

who already have some credit base established, find it extremely difficult to retain much flexibility in their program if a commitment is made on a long term note. In fact, interest in such a long term program would be practically nil because: (1) farmers seldom make detailed plans over a 5 to 7 year period even though the program may require such a time period, and (2) timing of the investment program will vary materially with year to year changes in price, yield and other expectations.

TABLE 2. ESTIMATED EFFECT OF SEVEN YEAR IMPROVEMENT PROGRAM UPON NET INCOME, 56 CONFEREES, FOUR SELECTED AREAS, UNITED STATES, 1951–52

	No. of cases	Improvement expenditures seven years	Net income at start of improvement program	Expected net income at end of improvement program	Increase in net income	Percent increase in net income	Annual return expected from improvements
Georgia	13	$34,948	$3,503	$6,231	$2,728	77.9%	7.8%
Indiana	14	17,416	4,453	7,464	3,011	67.6	17.3
Kentucky	18	14,792	2,378	4,789	2,410	101.3	16.3
Nebraska	11	10,084	2,016	3,977	1,961	97.2	19.4
Total	56	$19,207	$3,087	$5,633	$2,546	82.5%	13.3%

Source: L. E. Kreider, "Types of Credit Required to Facilitate Needed Adjustments in American Agriculture," Ph.D. thesis, Purdue University, August, 1953.

What term of note should be used to carry the credit program? In two recent studies completed in this area,[5] careful attention was given to the relative advantages and disadvantages of annual renewal loans versus longer term loans since the production credit associations involved in the studies currently use the annual renewal program. Advantages of an annual renewable program to the borrower for improvement programs on owner-operated farms include: (1) advances and repayments can be made highly flexible; (2) larger loans relative to collateral can be made than with longer term commitments; and (3) plans can be revised or changed quickly. Disadvantages to the borrower involve: (1) uncertainty of renewal conditions; (2) possible higher cost of funds due primarily to greater administrative costs; and (3) possible "credit rationing" due to rigid renewal policies or regulations. An annual appraisal of the year's results, which allows checking the progress and provision for changes in future plans, is a strong advantage of the annual renewable loan to both lender and borrower. Most farmers have in mind a long term operating objective and they plan year by year toward that objective. This objective is subject to constant revision as a result of economic and production uncertainty. Where a substantial amount of the investment loan is renewed from year to year, it is essential, however, to have a

[5] *Op. Cit.*, L. E. Kreider and J. H. Atkinson.

written agreement stating the conditions of the renewal. This currently is not practiced.

Commercial lenders must adapt their lending policies to the increased intermediate credit needs if they expect to serve agriculture well. If a low equity, insured loan program is extended to agriculture through commercial lenders, similar to that now existing on urban housing, this area would be the place to start in agriculture, rather than with real estate. Based on economic considerations, new improvements such as more machinery, livestock, buildings, tile, fences, and the like, create new wealth in agriculture just as new homes do in the general economy. It is not a matter of reducing equity requirements on an item that cannot be reproduced, but only transferred, as with farm land. Such a program in agriculture may need to be given serious consideration. Certainly, it has much greater economic justification than a low equity program for the purchase of farm real estate.

Long Term Loans.

Under present mortgage lending practices in the Cornbelt, not more than 40 percent of the current market price can be borrowed on the average. Loans as high as 50 percent on average quality real estate are not uncommon while 35 to 40 percent is the practical maximum on the best quality property. How much risk are commercial lenders taking with such conservative loan to value ratios? Why do they continue to loan a relatively higher percentage on average to below average real estate? How does the present mortgage market compare with that of the early 1920's? Is a low equity, insured loan program the solution? What can present lenders do to forestall demands for increased government participation.

Present mortgage loans are such a small percentage of the current market price that it is inconceivable any losses whatsoever could occur to the lender even with a drastic reduction in land prices. Delinquency and foreclosure have been practically non-existent since the beginning of the war. Even during the past two years there has been no marked increase in delinquency. True, this conservative lending policy has slowed the rise in farm land values during and following World War II. At the same time, it has increased the difficulty for young farmers and tenants to purchase farm real estate.

Compared with its earning capacity, the market price of average and below average land is generally above that of good land. Therefore, with the larger loans relative to selling price also on these properties, the problem is further magnified. This continues to be the perennial problem in farm mortgage lending, it has been proven statistically and generally

known for many years, but, little action has been taken to alter the situation. If there is any risk at all in farm mortgage loans currently on the books, is it not on these below average farms on which relatively larger farm mortgage loans have been placed?

The mortgage lending situation is now almost the reverse of the situation during World War I. First and second mortgages for a high percentage of the sale price, written on short term, unamortized notes, were common in World War I. Currently, we not only have conservative lending ratios, but partially or completely amortized loans for terms of 15 to 35 years. The present lending policy is bearable, and possibly economically sound, during periods of rapidly rising land values and high farm incomes such as were experienced during the decade of the 1940's. However, during periods of lower farm income and stable to declining land values, such as experienced during the past two years, conservative lending ratios will be a formidable barrier to the transfer of farms from one individual to another. In fact, such a situation would bring strong pressure for a lower equity, insured loan program similar to that pointed out by Butz in May, 1945,[6] or for an increase in direct government lending or insured lending through the Farmers Home Administration as pointed out by Black in 1945.[7]

After re-examining the many farm mortgage experience studies available and comparing lending practices on farm land with other industries, Jones and Durand in a study for the National Bureau of Economic Research point to the real danger of rising land values from a low equity loan program and to almost assured foreclosures and ensuing losses in periods of agricultural recession.[8] In addition, they concluded that farms in better land classes are capable of carrying higher debts relative to fair market price than those in poorer land classes. Only higher debt to value ratios on good relative to poor land can tend to equalize foreclosure and loss rates on different types of land and assist the potential buyer in recognizing and better pricing the different land classes.[9]

If commercial farm mortgage lenders are interested in forestalling further government participation in the farm mortgage market, is it not logical to assume they will have to liberalize their loan to value ratios, and in so doing, to become increasingly careful of amounts loaned on property of different grades within geographic areas?

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[6] E. L. Butz, "Postwar Agricultural Credit Problems and Suggested Adjustments," *This Journal*, May, 1945.

[7] J. D. Black, "Agricultural Credit Policy in the United States, 1945," *This Journal*, August, 1945.

[8] L. A. Jones and D. Durand, *Mortgage Lending Experience in Agriculture*, National Bureau of Economic Research, Princeton University Press, 1950, Chapter 9.

[9] *Op. Cit.*, Jones and Durand, page 141.

Problems in Getting Started in Farming

One of the best illustrations of the gaps existing in intermediate and long term credit is in the overall problem of getting started or established farming. This area is currently receiving increased research attention throughout the country. There has been much discussion concerning the difficulty or ease of getting started now as compared to some time ago. Changes in technology which have increased the size and capital requirements for efficient farming units are the principal basis for arguing it is now more difficult. On the other hand, rapidly rising farm prices and net incomes, until recent years, have tended to increase the success of individuals who got started.

Where tenancy is common, farm operators generally can get started with minimum capital requirements per unit of output by leasing a farm. Obtaining the intermediate term credit necessary to finance capital items such as machinery, breeding stock, and the like is the major problem of the operator in this situation. A term loan geared to the repayment capacity of the operator is necessary. Here, a strong case can be made for a three, five or seven year note as contrasted to an annual renewal note. The term loan pioneered by the Farmers Home Administration has real merit for such cases and should receive more widespread use by commercial lenders.

Progressive commercial lenders in agricultural areas have been financing young farmers. Their efforts should be increased and can be improved. The percentage of young farmers getting started in any community is low; only a small percentage of the agricultural loan portfolio as ever involved. A critical review of credit experience would indicate that a substantial percentage of their losses came from large operators with large loans. Generally, only a small percentage of total losses have been on the type of loan needed to get a young farmer started. This situation has been true in farm machinery financing by manufacturers and in the feed and livestock industry as well. There is no better future credit business than a young farmer getting started today. If he is started properly, he will be a customer for the remainder of his business career.

Where farm tenancy arrangements are not common in the community, the difficulty of getting started without outside financial help is much greater. In such areas a strong case can be made for lower equity loans with relatively long repayment terms and a flexible repayment plan. A 90 or 100 percent farm mortgage loan is not the answer for this problem. Neither the interest of the young farmer nor the lender is being served if all the risk is transferred to government or to the lender. Certainly a 75 or 80 percent insured loan has more merit. The variable repayment plans with which the Farmers Home Administration has experimented need to

be given serious study and more general application. Despite the criticisms of the variable payment mortgage loan, its theoretical justification is unquestioned.[10]

It would appear that the greatest contribution from the credit standpoint toward equality of opportunity in getting started farming would be obtained through: (1) making more general use of term loans for working capital needs with repayments budgeted against prospective income, and (2) easing down payment requirements on farms from the current 50 to 70 percent to not less than half this amount through an insured loan program of some type. There is real danger if equity requirements are reduced to a nominal figure that increased land values and loss experience would more than offset the benefits. In addition, increased research and attention to the use of credit insurance—life and crop as well as property—to reduce operator and lender risk is urgently needed.

Financing Commercial Agriculture

While it may be proper to look at the gaps in various segments of the credit market, is there not a real need for a new look at the whole farm credit picture? With the rapid trend toward fewer and larger farms and the distinction that is now apparent between residential units and commercial farms, conventional methods of financing are not well adapted to the commercial farming operation. Between 1930 and 1950 alone, the number of farms, as classified by the Census, declined nearly 14 percent. The important thing to note, however, is that commercial farms declined 30 percent while part-time and residential farms increased 60 percent.[11] The change has been rapid in this short 20-year span and its continuation appears inevitable.

The commercial farm today is not merely land, machinery, livestock, and other inventory items plus enough labor to operate it. The top one-third to one-half of our commercial farms require a very high level of managerial ability to coordinate the resources into a profitable operation. These farms have a high "going concern" value which cannot be independently related to the individual resources on the farm. Even though the individual proprietorship is still the unit of ownership, great strides have been made to insure continuity of operation and ownership. Certainly, much remains to be done in this area. But, with the increased size of operation, capital per man and importance of managerial ability, financing commercial agriculture is becoming more and more similar to financing corporate business.

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[10] For an excellent discussion on this subject see Virgil L. Hurlburt, "Economic Effects of Flexible Land Credit Arrangements," *This Journal*, February, 1953.

[11] K. L. Bachman, "Changes in Scale in Commercial Farming and Their Implications," *This Journal*, May, 1952, page 160.

These changes in agriculture have increased the need for specialized agricultural credit men. The lender must be better able to judge loans from a technical and economic standpoint and to assist farm borrowers plan their operation. However, he must remain an expert lender; he should not assume the role of a technical farm advisor on crops and livestock management, soil conservation, prices or the like. It remains the lender's duty to refuse a loan where extensive supervision appears necessary, since he gets no management fee for directing the farm operation.

Needed Shift in Financing Pattern

The nature of the agricultural operations today are such that the commodity financing approach is not adequate to carry the financing needs. Likewise, piecemeal financing, enterprise by enterprise, is not a sound credit arrangement.

Historically agriculture has been notorious for its fragmentary financing pattern. Until relatively recently, much of the financing has been done on a commodity basis. Even today it is not uncommon for lending institutions to approach the farmer's credit needs from the standpoint of financing feeder cattle, dairy, cotton, farm machinery, broilers, or tung nuts.

The merchant is still an important source of credit, but commercial lenders have materially reduced the proportion merchants have had to carry. For example, the farm machinery industry has made the most notable shift from manufacturer and dealer financing to commercial lender financing in the past two decades. Where manufacturers carried farmer notes equal to nearly one-half of their equipment sales throughout the 1930's practically all of this was shifted to commercial lenders in the 1940's.[12] At the moment manufacturers are financing practically no farmer purchases. Certainly, the average for the industry would be less than five percent of their current sales volume. The broiler industry is currently about in the same position that the farm machinery industry was in the 1930's. The bulk of the country's commercial broiler areas are being financed by the feed manufacturers and dealers.[13] Being a relatively new, highly specialized operation, it is only natural that conventional leading institutions have played only a small part in its development to date. However, with few exceptions, commercial lenders are now able and have had experience carrying much of the specialized credit needs.

Along with the historical commodity financing approach, specialized

[12] H. G. Diesslin, "Agricultural Equipment Financing," National Bureau of Economic Research, (in process of publication).

[13] For a detailed analysis of the differences between an independently and dealer financed commercial broiler area see two Purdue M.S. theses: "Broiler Financing in Indiana," Part I, by M. I. Bevins, January, 1954; and Part II, by R. D. Halleck, May, 1954.

lending institutions have developed which can finance part, but not all, of the farmer's operation. These institutions were developed in a time of critical need and were justified at the time. However, with the increasing size and commercialization of agriculture, we have now reached the point where a lending institution must be in a position to finance the "whole farming operation" rather than just a part of the farming operation. Specialized lending institutions which have been developed and can finance only part of the farming operation are at a competitive disadvantage in the agricultural lending picture. There are many disadvantages to financing a farm operation through several institutions, and this situation generally results in a more limited use and availabilty of credit than the farm operation may warrant.

Need For Balanced Credit Program

More emphasis is needed on a balanced credit program for the individual farm. There is a real need for a "package credit" to cover the entire farming operation. It can be provided best by financing the farm as a whole unit of operation, and not by breaking it down into short, intermediate and long term segments. In financing the farming operation, for example, long term credit should be used under the following conditions: (1) when credit is needed continuously over a period of years; and (2) when there is a possibility that changing economic (or other) conditions will extent the length of time the credit is needed. It is not important whether this credit is used for long term investments or for a series of short term investments. The important fact is that credit will be needed over a long period of time.

Even in the case of substantial improvement programs which we generally consider in the intermediate term credit area under present thinking, there are certain rules that can be followed with respect to this type of financing approach. As much long term credit as possible should be used to finance this improvement program with the following limitations: (1) The amount probably should not exceed the average amount of credit needed over the first several years of the improvement program. (2) Amortization should be extended over a fairly long period, maybe as long as 20 or 25 years in some cases, so repayments will be low. (3) Provision should be made for flexible repayment programs—advance or delayed annual payments and a complete repayment option after a few years without penalty. Short term credit should be used to take care of all seasonal fluctuations in credit needs and provide necessary credit for the improvement program that cannot be obtained through the use of the real estate mortgage.

Is there not need and justification for perpetual indebtedness on some

of our farms? Certainly one would be unwise to recommend permanent indebtedness on a high percentage of the farms in this country. But, is there any reason that the farm mortgage debt should ever be totally repaid on a 200-acre commercial Cornbelt farm currently worth $350 an acre? Is there any reason to reduce the indebtedness below one-fourth or one-third of the current market value? This would mean that the farm carry a $100 mortgage per acre with interest payments met annually. If the owner borrowed $150 per acre on this farm, is there any reason why more than $50 per acre should be included in the amortization schedule?

From the personal standpoint, there is reason an individual might want to pay off the loan, but from a strictly business standpoint, perpetual indebtedness would be justified and profitable except in periods of deep depression such as experienced in the early 1930's. The lender has a risk-less loan that yields higher rates than many other alternatives—government bonds for example—and this permanent investment reduces administrative costs on the loan portfolio. The borrower can generally earn higher returns than the interest cost of the loan, and the earnings that would have been used to amortize the loan can be retained to maintain or to improve production efficiency. Further research and possibly some experimentation by lenders is needed on this point.

A commercial farm today has greater debt carrying capacity relative to its asset value than was true even 20 years ago. Price and production risks have been greatly reduced during this short span of years. Improved insurance programs—life, crop and property—are available to further reduce management and production risks for the lender. Have lenders adjusted their agricultural credit program to the present day agricultural plant? A comparison of lending ratios in the two periods requires a negative answer. When lending institutions are in a position to finance the "whole farm operation," and only then, can they hope to give agriculture an efficient credit program.

DISCUSSION

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Dr. Diesslin has given us a comprehensive review of the financial structure of farm businesses and the practices followed by lending agencies in providing funds for acquiring and operating farms. He has also suggested some desirable changes in existing credit practices and pointed out some of the obstacles along the road to more efficient procedures in financing farm businesses. I shall comment briefly on several of Diesslin's suggestions and then offer an alternative procedure for your consideration.

Diesslin points out that the investment in machinery represents 12.5 percent of the farm capital now as compared to 6.5 percent in 1940. He also points

out that farmers have more capital in buildings, fences, water control systems and soil amendments than they have had in the past. These items have introduced a rapid increase in the value of intermediate types of capital assets and have decreased the relative importance of farm land and production assets such as livestock and feed. This situation, is responsible for the rapid increase in non-real estate indebtedness relative to the farm mortgage debt—a condition which he thinks undoubtedly is permanent.

The situation may not be as permanent as described. Credit has been easy to get the past fourteen years. Incomes have been high. Lenders have not felt the need for "riskless" collateral. Larger investments in land improvements, in equipment per operating unit and the need for more cash to pay operating expenses are permanent, but the credit structure may not be changed in the same proportion as the shift in capital investments. Farmers do what is necessary to get the funds needed in their businesses. In other inflationary periods, the non-real estate debt has gone up rapidly and then declined as unsecured notes and chattel mortgages have been converted into real estate debts. The farm mortgage debt was nearly $10.8 billion in 1923—three years after land market activity had turned downward. A considerable part of the $2.3 billion added after 1920 represented transfer of non-real estate to real estate debt. This situation can be repeated. One insurance company has reported brisk activity in farm loans since the recent down-turn in commodity prices. Farmers have been clearing their chattels so they can have security for short-term and intermediate credit. The mortgage on the machinery and livestock is shifted to a real estate mortgage. This procedure may be responsible for a considerable part of the recent growth in the farm mortgage debt. It is doubtful if the non-real estate debt of farmers will remain a fixed proportion of this type of assets for any long period of time.

A farmer with an efficient business will continue to own proportionately more machinery than he had in 1940, but he will also have more land or more livestock or both. Otherwise, he will have a high machinery cost per acre, or other unit of use. A part of the increase from 6.5 to 12.5 percent of total capital in machinery since 1940 is due to excess power and equipment on farms. In many cases a machine has been purchased to replace a hired man or son who has been drafted for military service. The new piece of equipment is used only a part of the time when it is in season. The investment represents excess capacity, which is economic waste. As farmers adjust operating units to the full seasonal capacity of the machinery that is available to them, the investment in this form of capital as a proportion of the total can be expected to decline. However, it may not go back to the 6.5 percent ratio of 1940.

The description of gaps in current credit practices follows the conventional short, intermediate and long-term method of classification. In terms of the type of property being financed, short-term credit is associated with non-real estate items and long-term credit with farm real estate. Intermediate credit overlaps into both areas. Thus, intermediate credit becomes a "catch all" category which includes items with a productive life in excess of one year. Loans to improve efficiency, to change enterprise combinations or to expand the size of business are discussed under intermediate credit.

Diesslin points out that the investment in improvement programs may equal or exceed the initial investment in real and non-real estate assets. Where applied intelligently returns are high. The time required to complete the work may be as long as seven years and there is considerable lag between invest-

ment and returns. In many cases short-term or intermediate credit is used to make the improvement. Neither type is geared to the income flow resulting from the investment.

The gap here may be more apparent than real. Several agencies have announced their willingness to make farm improvement loans geared to specific needs. The American Trust Company of St. Joseph, Missouri was organized expressly for this purpose. The Federal Reserve Bank of St. Louis has promoted specific types of commercial bank loans for farm improvement purposes. The Federal Land Bank of St. Louis has made some improvement loans. The Farmers Home Administration has followed the practice of putting tenant purchase farms into good operating condition throughout the history of the program. Despite high returns and willingness of credit agencies to enter the field, relatively few improvement loans are made. Perhaps risk and uncertainty is the cause; or it may be lack of foresight on the part of farmers. Very few of them plan their businesses for more than one year at a time.

In the field of long-term credit, Diesslin summarizes the findings of Jones and Durand in which they point out the inflationary effects of low down payments upon land values, the high incidence of foreclosures and financial losses on the poorer grades of land and then concludes the discussion with this statement of the problem:

"If commercial-farm mortgage lenders are interested in forestalling further government participation in the farm mortgage market, is it not logical to assume that they will have to liberalize their loan to value ratios, and in so doing, to become increasingly careful of amounts loaned on property of different grades within geographic areas?"

It is my impression that commercial lenders have tried to classify land and to use productivity as a guide in deciding how much to loan. Some of them have refused to make loans in low producing areas. The purpose, of course, has been to reduce foreclousures, if and when another depression comes and to keep losses at a minimum. Many of us believe that the policy has also kept land values down—at least to some extent—and this too has been a desirable goal. Is Diesslin saying that private lenders must abandon these objectives or the government will come into the farm mortgage field with unlimited funds for low equity financing? If this occurs, who will furnish the money? Perhaps the government will "conjure it up." Under these conditions, how will land price inflation be held in check? He does not deal with these problems.

If lenders extend funds beyond amounts secured by equities arrived at by assigning conservative values to assets, they must depend upon the managerial skill applied to the farm business. For many years thoughtful farm managers have recognized the fact that there is more in the man than there is in the land. Diesslin insists that "the lender must know farming, be interested in farm people and able to get along with them. He must be able to judge loans from a technical and economic standpoint and be willing to assist prospective farm borrowers in planning future investments. However, he should not take the role of technical farm adviser on soil conservation, crop or livestock management, farm prices or the like. He should know where to send clients to get this information; he is an expert lender, not a farm manager."

The converse of this point of view is that the farm manager should deal only with the details of farm organization i.e. cropping systems, soil treatments, conservation systems, farm and farmstead layouts, types and numbers of livestock and leave the financial plan to the lender. This may be the greatest

single gap in credit practices. It is agreed that the lender should not replace the technician in laying out water control structures or the veterinarian in treating livestock diseases. Neither should the farm manager. No matter how sound the organizational plan of a farm may be the enterprises must be financed, if the business is to be a successful venture. It is difficult to understand how a lender can go beyond conservative equities in making loans, if he does not base his decisions upon income prospects which are the end products of sound management. Many of the organizational plans of farm managers remain in table and dresser drawers because they have not been accompanied by a financial plan. In other words, successful use of credit is a management problem. Many lenders are recognizing this fact. They are putting well trained men in charge of loans to farmers. Why should we object to this trend?

The obstacles to use of credit in financing sound farm businesses are many. Some of them are associated with borrowers, others with lenders. It has been pointed out that 60 percent of southern Iowa farmers were not making investments they considered near certain of returning more than the annual outlay of expenses because of risk or uncertainty. The paper just presented emphasizes the large amount of capital required in commercial farming operations and the gaps in current credit practices that prevent optimum combinations of economic factors on farms. Commercial lenders are warned that they must do something about these problems or the government will be forced to expand its farm financing operations. What can the commercial lender do? Perhaps he can do very little under the present credit system, but new institutions can be created that will permit investors rather than tax payers or lenders to make risk capital available to farmers. Why not set up farm corporations and finance them through the sale of stock in the same way as General Motors, U. S. Steel and other large businesses are financed. Let the corporation own adequately financed farm businesses with buildings, fences, water supply, conservation structures in place, soil fertility at the optimum and livestock adjusted to both the feed supply and available markets. These farms can be made available to tenants under some form of standard lease. The rent can be used to pay landlord expenses and dividends to stockholders. This arrangement will bring the risk capital of investors into agriculture. A young operator will not need to start farming on poor land with inadequate funds for improvements and insufficient working capital. He can have a well balanced farm business which will permit him to start accumulating capital from the outset. When he has sufficient savings for the equities required by conservative lenders, he can buy the farm business. The corporation can take the money and develop another business that will give another family an opportunity to start with adequate land and working capital. Such a plan would go a long way toward eliminating the gaps in current credit practices.

CURRENT GUIDES AS TO SAFE DEBT LOADS FOR FARMERS

REX R. BAILEY
Doane Agricultural Service, Inc.

A FEW of you may be old enough to remember, and all of you no doubt have heard of, the fantastic loans made in some areas in the "Roaring Twenties." These led to many foreclosures, heartaches, loss of old family homes and a sizeable loss to many savings investors who could ill afford to stand such losses.

Our own company had the sad experience of liquidating some 1,500 farm loans from the small office at Quincy, Illinois, which I headed during the 12-year period beginning with the early thirties. These experiences, together with similar experiences of other companies, gave a great impetus to thought and study concerning how such a fantastic debacle could be avoided in the future.

For a number of years we made studies for various loan companies endeavoring to determine what factors might have caused some of the errors made in setting up these bad loans. In many instances it was found that the difficulty came not because of setting too high a loan level but because of a lack of knowledge as to the comparative value of various lands. A company would start loaning in a certain good area and, as their business expanded, the perimeter of activities was extended until many areas of lower land values were included. Due consideration to the change in type and productivity of the land as this perimeter was expanded was not given, and, as a result, excessive loans were made on some of the lands in these outlying districts.

I should like to make it clear in the beginning that it is very difficult to set up safe guides that will cover all loans because each farm and each borrower presents a different problem and conditions which fit one may not, in fact usually will not, fit the next.

For instance, even in the period of the thirties when so many people in northeast Missouri were losing their equities in land, there were individuals with just as large loans who by some means or other managed to save their farms. The will to succeed—the ability to do other jobs—to earn outside money—the willingness to live on practically nothing in order to make things work out—in many cases made the difference between success and failure in the saving of the home property.

In many instances the lenders were willing to cooperate. I recall one case where we went to a lender and outlined the facts as we saw them concerning this particular loan. We recommended a reduction of $1,000 in the principal and at the same time recommended an additional advance under a chattel mortgage of $1,000 for the borrower to purchase additional

livestock with which to operate. We were convinced of the borrower's sincerity in wanting to hang on and through this procedure we were able to salvage a good loan which was later paid off in full, and to salvage a good farm operation which even today is still being carried on by one of the borrower's descendents.

We had another case very similar where the collateral security was worth, based on the then low values, about as much as the loan amounted to. The current income was badly curtailed and so we made a proposition to both the borrower and lender that the borrower apply on the loan the proceeds from a certain number of hog sales each year. This would have provided a small payment of interest currently and when hog prices went back to normal should have allowed for eventually paying off the loan. This borrower, who had a much more attractive deal then the other party previously described to you, failed to go ahead because when hog prices went up he considered the payment too high to make and he moved off and forfeited his equity in the entire property, an equity which today would be worth three or four times the amount of the loan then outstanding.

Farmers Continue to Have Financial Problems

Farmers today are, and will likely continue to be, faced with just as many problems as some of our borrowers were in those trying times of the thirties. Conditions are of course different, but there are many dynamic technological and economic forces bringing about more physical production on one hand, and keener competition for market outlets and increased pressure on prices on the other hand. This is reflected in the tendency for farm prices to decline a bit at a time when costs have remained relatively high. This means that farmers facing the cost-price squeeze in an effort to maintain their net income position must either produce their supplies more efficiently, thereby getting lower unit costs, or sell their products at a higher unit price, or some combination of both. These factors of course have a bearing on the amount of debt a farmer can safely carry under current conditions.

Over the past ten or twelve years the volume of farm loans has, as you know, been low. Loans have been moderate but we note that there have been a few foreclosures averaging up to 1.7 farms per 1,000 loans during the past year. We also note that some form of credit was used to finance some 71 percent of the farms bought last year, this being compared with 67.5 percent in 1952 and 44 percent from 1944 to 1946. These trends should make us realize that we need to take a new look at the farm credit picture if we are to prevent the recurrence of some of the hard days in the thirties.

May we, before outlining some of the possible guides that can be used to regulate debt loads, be permitted to discuss a few factors that have a bearing on this entire debt situation?

As has been repeatedly stated, management is more important today than ever before. Farming is financially and economically different from even the early forties. Some of the outstanding changes are:

(1) Farmers are out more for cash operating costs.
(2) They use more short-term credit to finance their operations.
(3) More of their capital is invested in operating assets.

For instance, as you will no doubt recall, a Minnesota study revealed some time ago that on a sample test of 100 farms the average investment in machinery was $2,759 or 8 percent of the total capital invested in these farms in 1940, while on the same farms in 1952 the average invested in machinery was $8,446 or 14.5 percent of the total capital. This all adds up to the fact that the operator must exercise more judgment as to where to increase his costs and where to cut without jeopardizing his entire operation.

It seems inevitable that farmers as a whole will be investing a still greater percent in equipment and in operating costs than they have been even during the past few years.

You will all recall a most interesting paper entitled "The Changing Nature of Farm Operating Costs" wherein Lowell S. Hardin summarized some reference material indicating some of these expressed changes. One thing that has not been stressed, however, about this paper is the statement indicating that a farmer in 1907 with no debt could pay 33 percent of his operating expenses with a sum equal to 5 percent interest on his capital investment, while in 1947 the same 5 percent interest charged on his capital would cover only 11 percent of his total current yearly operating costs. In other words, while the total debt on the farm remains an important item, certain fixed charges such as interest on this debt, are today not nearly so important in relation to the success or failure of the yearly operation as are the other current annual operating costs.

R. H. Wilcox of Illinois puts it another way—Cash operating costs have increased about 400 percent in 40 years, with costs in 1952 taken from farm cost records in six central Illinois counties showing approximately $60.80 in cash spent per crop acre per year. And this cost does not include the purchase of new machinery or new bulidings which might be needed or added.

Consider the Purpose of Loan

Many loans were made back in the twenties for the purpose of building new homes, or for other purposes tending to make living more gracious and without due consideration as to how the interest on these loans was

to be earned and paid. In other words, too little thought was given to the purpose for which the loan was to be made and too little thought was given to the ability to repay interest and principal. Today a lender should have in mind the purpose for which a loan is desired. If it is to increase the fertility of the land, to prepare for use of improved conservation methods, to build a new dairy operating setup that will save enough labor over a limited period to repay the cost, or for any other economic purpose, then the loan would be justified and the purpose worthwhile. Would it not be far better, however, to postpone the building of a new house until other items were paid for and the land itself could be expected to pay the interest and principal on such a loan?

Guides to be Considered

Fluctuations in price level ruined many farmers in the past. We hear from many quarters today, however, that the economic price level cannot go down materially because of the huge government debt and the need for servicing same and refinancing same with cheap money, the devaluation of the dollar which has made it cheaper period by period, and the many other factors that can be cited. *We do know, however,* that the farmer is already facing some devaluation in the price of his products and this in the face of increased costs, and we do know that in the past it has been easy to make a profit on farm operations when prices of products were going up and it has been equally hard to break even as prices go down. Certainly consideration should be given to some fluctuation in the price level when loans are considered by any lender.

Certainly any intelligent borrower who does not make provisions for payment of his interest and principal even under adverse conditions is not taking due precaution to protect his family in case those adverse conditions should develop.

In searching for some safe guide as to performance of loans in recent years, we have checked into considerable reference material and have found that E. B. Hill of Michigan State College points out in the October 1953 issue of the *Michigan Farm Economics* publication that the average mortgage per farm reporting mortgages in the 1950 census was $3,181 or about 31 percent of the reported average value of the farm. With this level of mortgage debt, foreclosures in Michigan were relatively low, and even with the drop in price of products, most borrowers in that section have not been financially embarrassed.

We read of such men as Howard Agee of Kentucky, who was written up in the summer issue of the *Farm Quarterly* of 1954, who started with a very low equity and has rather rapidly accumulated a nice equity in his land. In our own experience we have had contact with tenants who have

made very rapid progress in the accumulation of assets where they were willing to cut costs to the bone and to follow the best management practices.

We had one man who came to us in 1945 with two mortgages on all of his personal property. The loans amounted to just about twice the actual cash value on his chattel. True, he became a tenant on a rather good livestock farm, was willing to milk cows, tend hogs and work long hours. In two years he paid off both mortgages and left the property to buy one of his own, paying down some $1500 in cash, and had a nice nest egg left on which to operate the following year. This compares favorably with some of our recollections of experiences in the 1900's when men we knew during the drouth in 1900 baled hay in order to make both ends meet. One man went out and constructed barns and other buildings in order to earn money to buy feed for livestock and food for his family. All of these experiences, however, demonstrated several essential qualities. First, the will to do. Second, the use of good management practices. And third, the willingness to do without those luxuries which many others demanded as their rightful part of current living.

We were privileged to review a paper recently prepared by William L. Cavert, director of research of the Farm Credit Administration of St. Paul, entitled "Can Capable Farmers Handle Debts Equal to 50 percent of Assets?". In this paper he used data taken from the Minnesota Farm Management Service for the years 1947-52 inclusive, and after making certain assumptions attempted to show calculations indicating the possibility of these farmers carrying a 50 percent debt load. His final conclusion was that for the four years 1949 to 1952 this particular group of farmers would have had, on the average, only a $265 margin after paying all current costs and covering the amounts required for debt service. His logical conclusion from these results was that the 50 percent rule was not adapted to the great majority of farm operators in southeast Minnesota. The top 20 percent of the operators would have come out with very satisfactory totals to cover family living and debt service.

Considerations of Collateral

Land: In attempting to arrive at a value on which to base judgment as to a safe loan level, we have come to the conclusion that the sale price of land is not a trustworthy figure to rely on. Often, many in competition for a certain property will bid these much higher than their true worth. Therefore, in judging loan value one would, in our opinion, be much safer with appraised values: rather than to sale prices. If appraisals are made on the principles as laid down by the American Rural Appraisal System with typical operation and typical rotations assumed, and with

an average of prices for products for the past 15 to 20 years, one can then arrive at a value that is likely to be stable over a long period of years.

The American Rural Appraisal System arrives at value through the process of determining earnings under such typical operation, and this earnings value is then adjusted for location, home use and other such factors as may affect basic value. To those who are making loans, however, earnings value probably means more than total basic value because unless the property has the ability to repay the money loaned out of the operation thereof, it can become a bad loan to the lender and an unwelcome asset to the borrower in times of bad crops or price recession.

If loans are made on the basis of such an average appraisal they would be more generous in times like the thirties when sale price many times failed to even approach basic value, and when it was repeatedly demonstrated that 100% loans were sound, feasible and readily worked out to the advantage of both lender and borrower. On the other hand, they would never be raised to the highs of today's sale prices and a more conservative approach toward the lending and borrowing of funds on farm property and farm operations would be followed.

In our discussion we have covered the topic in question from the lender's viewpoint. The same basic principles hold, however, when one goes to borrow money, and certainly policies that are safe for a lender are conservative and within reasonable expectations of fulfillment for the borrower. Certainly under today's technological developments where operating costs are materially higher than previously, any borrower should protect himself by keeping adequate reserves to cover emergencies, temporary crop failures and other such events. The wise borrower might also be well advised to set up insurance protecting his family in case anything happens to him personally.

In making studies for various companies we have in the past built our reports on the assumption that there are no fixed or unchangeable loan requirements. Those responsible for creating a farm loan policy should be in a position to keep flexible the amount of the loan per acre, interest rates, percentage of loan to appraised value and other basic considerations.

Considering farm collateral as security for a loan, any good lender would be wise to examine various factors covering not only the locality of the farm, but the property itself. There are seven of these major factors: *Soils, Economic factors, Erosion, Credit records, Hazards, Type of farming* and *Industrial relations,* which have a bearing on the value of the property as an asset for loans. Of these, *soils* and *economic factors* should weigh much the heaviest.

There are also five minor factors that should be studied, but perhaps not weighed so closely. These should be considered under the headings of: *Topography and drainage, Climate, Crops and livestock, Personnel factors and Laws in the community where the property is located.*

By the proper evaluation of the above factors, land can be classified as to grade for loan purposes. These factors would be listed on a score sheet with the system so arranged that top farms could be scored up to 100. These top properties would merit long-time loans with low rates of interest, low commissions and in these top areas and on these best lands a high percent of loan to appraised value appears safe. We believe that today loans up to 60% of the appraised value on such areas should prove safe. Loans on such properties require a minimum amount of service, and only minimum annual payments need be required. The borrower is safe in taking out a loan on such properties because there is always someone willing to take over and pay him something for his equity, should his own circumstances prevent a continuation of farming.

As we go on down the scale of quality to those scoring below the top, loans should be slightly shorter, interest from the lender's standpoint should be higher because of higher risk and the percent of loan to appraised value should be reduced to at least 50 percent or under. Definite annual payments should be required on the principal so as to protect both the lender and borrower.

In arriving at safe loan values on the still lower scoring properties one would recommend shorter loans, not over 10 years in length, with still higher interest rates and a still lower percent of loan as compared to appraised value. Forty percent should be the maximum on these lower grade properties. These farms still make good loans if properly supervised and if definite payments on principal are made each year. From the lender's standpoint it might be wise to stipulate that certain rotations should be followed and certain crops should be grown—and it certainly would be to the borrower's advantage to take advantage of all the assistance he can get in applying the proper management practices to his business.

Many of the lowest scoring properties should not be qualified for loans —frequently they have no capacity for net earnings and borrowers would be unwise to take on obligations based on the hope of payment from earnings from the property. A loan in a case such as this would need to be more of a *character loan on the borrower.*

Chattels: Certainly all chattels involved in judging the credit rating of any proposed borrower should be carefully listed and evaluated and loans on chattels should carry more margin than loans on Real Estate.

Personal Considerations

It seems to us that the borrower himself has become more important as land values increased and as higher loans per acre are being currently made.

Statistics show that as an individual farm operator the borrower is on the average now feeding 75 percent more persons than in the 1939 period and, in addition to that, each person is eating, based on the 1953 dollar, some 25 percent more products per year than in 1939. Certainly such factors as the borrower's age and health should not be overlooked. The average man becomes less active after age 45, so should not assume such heavy obligations after that period of life is reached. The borrower's past experience, his business judgment and the respect held for him in the community are all factors that should be given consideration.

Many times the amount of help accorded the operator by his family in getting the farm work done is a factor that spells success or failure. The borrower's attitude toward farming is vital. Financial statements over a period of years showing how he has handled his past financial obligations help in judging the moral value of a man. Character is certainly a major factor. And last but not least, the capacity of the borrower to repay debt as measured by the operator's labor income and the return on his capital and unpaid family labor over a period of years is a good guide as to his ability to pay under normal conditions.

DISCUSSION

GEORGE A. POND
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I deeply appreciate the honor of discussing the very interesting and stimulating paper by Mr. Bailey. I do not pose as an authority in the field of farm finance but 40 years of farm management research does give one a considerable insight into the matter of safe debt loads for farmers. I would like to supplement this paper by developing some aspects of the subject not covered by Bailey and perhaps elaborate some that he passed over hastily.

Bailey has confined his discussion largely to real estate mortgage credit and particularly to the appraisal of collateral behind the loan. With the new mechanical and technological developments that are revolutionizing agriculture, chattel mortgage credit to supply working capital and mechanical equipment has become increasingly important. We need some rules as to safe limits to loans in this field. Last year in a study of the financial problems of beginning farmers we asked the members of two farm management associations in Minnesota what they considered safe debt loads for beginning farmers. The men to whom this question was addressed were for the most part successful farmers of somewhat more than average ability, experience, and judgment. They were looking at the matter from the standpoint of the borrower rather

than the lender. Their seasoned judgment was that young farmers starting as tenants might safely borrow up to 50 percent of the minimum working capital they needed.

The question was then asked them as to their judgment on safe limits on real estate mortgage credit. It was stipulated that the borrower own, free of incumbrance, the working capital needed to operate the farm he was purchasing and also his personal property and household goods. Further assumptions specified were (1) that the unpaid balance could be financed by a long time mortgage upon which interest plus payments on the principal would be on an annual basis of about 8 percent of the original amount of the mortgage, (2) that the prices of farm products for the next ten years would be about as they were in 1952 and early 1953, and (3) that operating and living expenses would also remain about as they were in this same period.

The judgment of these experienced farmers was that under these conditions the purchaser should be able to pay down 34 percent of the purchase price and could safely borrow the balance on a long time mortgage. Their estimates showed little deviation about this figure. Most commercial or cooperative loan agencies would in general hesitate to loan so large a proportion of the purchase price but with the assumptions stipulated it would seem to be a reasonably sound proposition.

Bailey appears to be concerned with current guides as to safe debt loads primarily from the standpoint of the loan agency and more particularly with those public loan agencies that must conform to certain legal restrictions in their operations. It may be well to call attention to the fact that according to a recent release by the Production Economics Research Branch, AMS, approximately 40 percent of the outstanding farm real estate mortgage debt in 1954 was held by individuals. This exceeds by more than 50 percent the amount held by their nearest competitor, the life insurance companies. It is nearly three times the amount held by either the Federal Land Banks or by commercial banks. There is far greater variability and flexibility in the loan policies of these individuals. They are better able to adjust their loans to the needs, capabilities, and capacity of their borrowers.

This brings me to the only contribution, if any, that I have to offer to this discussion of farm credit. Three fundamental bases for credit have long been recognized—character, capacity, and collateral. The first two receive generous mention in any discussion of farm credit but when it comes to actually closing the loan it is the collateral that receives the studied scientific appraisal. Bailey should be commended for calling attention to the progress in collateral appraisal from the "wind-shield appraisals" of the "roaring twenties" and earlier to the present scientific appraisal of basic normal earning value. The American Rural Appraisal System has been an invaluable contribution as a guide to safe debt loads. We should now attack, with the same vigor, the same energy and the same zeal an appraisal of the other two sides of the credit triangle—character and capacity.

Bailey has referred to the revolutionary changes in farm mechanization and techniques of recent years. It has been said that there have been more technological changes in agriculture in the past 50 years than in the previous 50 centuries. Most of these have come within the life time of the present generation of farmers. Familiarity with these new techniques and the "know-how" to use them successfully have become the dominant determinant of success

for the farmer of today. I would not at all belittle the importance of a most searching appraisal of the collateral but I sincerely believe that capacity to use modern scientific techniques is rapidly approaching first place as a guide to a safe loan to a particular individual.

This importance of the factors of capacity and character were strongly stressed by the experienced and successful farmers interviewed in the study mentioned earlier in this discussion. In fact their replies stressed the personal characteristics of the borrowers as far more important than their capital assets in determining the size and safety of a loan to them. Among these character and capacity factors they listed interest in farming and liking for farm life, familiarity with the new farm techniques, courage, faith in the future, ambition, determination, and those simple cardinal virtues of honesty, industry, and frugality.

I realize that my ideas on character and capacity as a basis for determining the safety of a given loan sound quite unorthodox to most institutional lenders. However if we are to continue to make progress in scientific loan policies we must put the appraisal of character and capacity on the same scientific basis as our appraisal of the collateral. It is a difficult task. Higbie, Hamer, Wilcox, Reiss, Hess, Miller and others have blazed the trail and pointed the way but substantial progress in personal appraisal is still in the future. We will have to go outside the field of economics for assistance. Undoubtedly we will have to invite the cooperation of the psychologist, the sociologist and others. I am not suggesting any less emphasis on the appraisal of collateral in which we have already made sound and successful progress. I am merely pressing the opinion that most of future progress in determining safe debt loads for farmers will be in this field. This is thrown out as a challenge to both lending agencies and economic researchers.

AGRICULTURAL DATA

Chairman: James E. Crosby, Jr., Extension Service, USDA

AGRICULTURAL DATA REQUIREMENTS—NATIONAL, STATE, AND COUNTY

WALTER H. EBLING* AND HENRY L. AHLGREN**

AGRICULTURAL data requirements have changed with time. When the collection of such data first began, the interest was mainly in an inventory of agricultural resources for the nation and their geographic distribution by states and territories. This inventory concept was one of rather static data and such data were first collected by the United States Census in 1840.[1] Later such national and state inventories were no longer sufficient and in the 1850's demand for more frequent short-time interval information such as year-to-year production estimates and monthly changes of crop prospects during the growing season, brought about a program by the USDA providing such data.[2] These were the origins[3] of the two complementary data systems we now have—the Census to provide major inventories at relatively long intervals, and the Agricultural Estimates Division of the Department of Agriculture to provide current seasonal and annual material of a dynamic character, much of it projected from census benchmarks.[4]

National and state totals for major agricultural items were probably adequate for the uses of that time, but gradually more was required. Since the establishment of Agricultural Extension work in 1914 changes have been especially rapid. Today so much of the work in agriculture is organized by counties that national and state data no longer suffice. Much of our agricultural work, like that of the historians, has changed from broad, general or macrocosmic considerations to the particular or microcosmic in constituent units of the state and nation.[5] In fact, when workers at state and local levels are now asked about their agricultural data requirements they show clearly that the great frontier of unsupplied needs lies first at county and second at state levels. The term "county"

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[1] Archibald Russell, "Principle of Statistical Inquiry—Etc.," *Census of 1840*, D. Appleton Co., New York, 1839.

[2] U.S.D.A. Misc. Pub. 171—November 1933.

[3] See paper by W. H. Ebling, *This Journal*, Vol. XXXI, No. 4, Page 718.

[4] For a summary statement on current data work of the Department of Agriculture see O. V. Wells, *This Journal*, Vol. XXXI, No. 4, Part 2, Page 858.

[5] An early historian's viewpoint of the changing idea of studying historical events from macrocosmic to microcosmic areas is found in "Main Currents of Historical Thought," P. N. Miliukov, St. Petersburg, 1898.

here is used broadly to include local data which at times may be for smaller areas, such as minor civil divisions within counties or a valley or basin producing a specific product. This does not mean that national data are less important than they have been, but it does mean that requirements at that level are relatively better supplied than those in states and counties. In fact, it becomes a matter of bringing the state and local material up to the completeness already achieved at the national level.

That this is not always understood was clearly brought out at one of the sessions of this Association at Corvallis, Oregon last year.[6] There are still those who insist that our first objective is national estimates and who are both critical of any data work that does not lead to national totals and impatient with emphasis on the collection of local data and efforts to provide special series by states, counties, or other local areas. Half a century ago the holders of these "macrocosmic" views would have gotten few arguments, but modern agriculture is highly specialized both as to production and markets, and must be considered in terms of the relationship of its parts. As more and more of our work in agriculture is organized by counties, data for states and parts of states are increasingly required even though they do not lead to national totals. Actually for many farm and marketing decisions local and state data are more important than national totals. The field of work can be distinctly identified at three levels—local, state, and national—to serve specific requirements at each level.

Surveys of National, State and County Requirements

Because a marked difference of view has been noted between some at the national level and workers in the states as to the demand for data at the different levels,[7] surveys were undertaken in 1954 to bring together the judgment of informed individuals as to the requirements of agricultural data for the three strata—national, state, and county. An expression of judgment was sought from State Directors of Extension, County Agricultural Agents in Wisconsin, State Agricultural Statisticians, and State Supervisors of Vocational Agriculture. Three of these groups were surveyed by the Wisconsin Agricultural Statistician, and a similar survey of the Wisconsin county agents was sent out by the Director of Extension.

The inquiries contained two questions. The first dealt with present demand or use of data and asked the respondents to divide the volume percentagely into the three strata—national, state, and county or other within-state subdivisions. The results of the first question are shown

[6] See paper by Peyton Stapp, *This Journal*, Vol. XXXV, No. 5, Page 865.
[7] R. A. Bodin, *This Journal*, Vol. 35, No. 5, Page 872.

in Table I. The second question related to data that were wanted, but which are not now available, and respondents were asked to divide these

AGRICULTURAL DATA REQUIREMENTS NATIONAL, STATE, AND COUNTY

4 Surveys
Percentages shown are straight averages of reports for each group

TABLE I. USE OF AGRICULTURAL DATA

1. Directors of Agricultural Extension (44 states)[a]	
a. National data	27.0
b. State data	31.2
c. Data for counties or other within-state subdivisions	41.8
Total	100.0%
2. County Agricultural Agents in Wisconsin (61 counties)[b]	
a. National data	15.2
b. State data	27.5
c. Data for counties or other within-state subdivisions	57.3
Total	100.0%
3. State Agricultural Statisticians (44 states)[c]	
a. National data	10.3
b. State data	41.9
c. Data for counties or other within-state subdivisions	47.8
Total	100.0%
4. State Supervisors of Vocational Agriculture (31 states)	
a. National data	23.5
b. State data	37.8
c. Data for counties or other within-state subdivisions	38.7
Total	100.0%

[a] States not reported were Minnesota, Montana, New Mexico, and Utah.
[b] Wisconsin has 70 county agents.
[c] States not reported were Delaware, Maryland, Missouri, and Nebraska.

additional requirements percentagely into three strata in the same way. The results of the second question are shown in Table II.

Local Data Emphasized

The Directors of Agricultural Extension administer perhaps the largest and most effective field organization in American agriculture. Extension work brings new information from research and other sources to rural communities and helps them to achieve better farming and better living. In their complex job the Extension workers are among the most important users of agricultural data. For that reason the judgment of Extension leaders was sought concerning their data requirements for different levels. In Table I, it will be noted that the estimated uses of data in Extension work run 27.0 percent national data, 31.2 percent state, and 41.8 percent data for counties or other local areas. When examined by regions the reports show some variations, but in all regions except

the Atlantic States the county percentage is the largest. Generally the emphasis on county data is highest in the North Central and Western States and lowest in Eastern and Southern States.

The reports of 61 Wisconsin county agents show even greater emphasis on county or local data use and less on national and state data than the

TABLE II. NEW REQUIREMENTS, DATA NOT NOW AVAILABLE

1. Directors of Agricultural Extension (42 states)[a]	
a. National data	14.7
b. State data	27.0
c. Data for counties or other within-state subdivisions	58.3
Total	100.0%
2. County Agricultural Agents in Wisconsin (58 counties)[b]	
a. National data	13.3
b. State data	27.6
c. Data for counties or other within-state subdivisions	59.1
Total	100.0%
3. State Agricultural Statisticians (44 states)[c]	
a. National data	6.7
b. State data	26.8
c. Data for counties or other within-state subdivisions	66.5
Total	100.0%
4. State Supervisors of Vocational Agriculture (34 states)	
a. National data	15.8
b. State data	29.4
c. Data for counties or other within-state subdivisions	54.8
Total	100.0%

[a] States not reported were Minnesota, Montana, New Mexico, Oregon, Utah and Wyoming.
[b] Wisconsin has 70 county agents.
[c] States not reported. (Same as Table I)

averages or reports from 44 Extension Directors. The reports from the county agents showed little variation and were surprisingly uniform. Broadly the answers from county agents show the same emphasis as expressed by Extension Directors. The judgment of data use by county agents was as follows: national, 15.2 percent; state, 27.5 percent; and county, 57.3 percent.

State Agricultural Statisticians experience much of the public demand for data. By virtue of their positions they see the flow of requests from many sources. A survey to get the composite judgment of these men regarding kinds of data asked for brought replies from 38 offices representing 44 states. Like Extension people they reported a high percentage of the requests for data in the state and local strata. Their averages differ from the Extension groups in that they show less demands for national and local data, but show more state level demand. While the judgment of statisticians showed some variation by states and regions, they were in close agreement.

While in most cases these figures were reported as the judgment of state statisticians who experience the flow of requests for data, in a few cases the men took the trouble to go through files of requests and actually count and classify the items requested. In South Dakota such a count became the basis for the following figures in Table I: National, 2 percent; State, 32 percent; and county or other local, 66 percent. In Kansas a count of 232 requests for information resulted in rounded figures of 5 percent national; 45 percent state; and 50 percent county or other local data. For Table II results of the South Dakota count of requests for data were: National, 4 percent; State, 31 percent; and county or other local, 65 percent.

Averages of 31 reports from State Supervisors of Vocational Agriculture showed more emphasis on state data than any group except the Statisticians. Fewer of these men replied to the inquiry than in the other groups, indicating less concern with agricultural data needs.

The four groups show a range from a high of 27.0 percent national data by the Extension Directors to a low of 10.3 by the Statisticians. For state data the high of 41.9 was reported by the Statisticians, and a low of 27.5 by county agents. On county or local data the high of 57.3 percent was reported by county agents and a low of 38.7 by Vo-ag supervisors.

New Requirements in Table II

In Table II the averages for the reports of the four groups are shown for needed new data not now available. Here the percentages ran much lower for the national stratum and much higher for the county and local than in Table I. State figures here also are lower than in Table I, but the difference is not as great as in the other two strata. Here the national data demand as shown by the average of the Statisticians was the low average of 6.7 percent compared with a high of 15.8 for the Vo-ag supervisors. State level requirements reported here are relatively uniform for all groups, but county or local requirements run relatively higher than in Table I. Here the average for the Statisticians with 66.5 percent represents the high, Vo-ag supervisors the low of 54.8. On this stratum the two Extension groups are very close together at 58.3 percent for the Directors and 59.1 for the county agents. Perhaps one of the important points in this table is the close agreement of all groups as to where the main new requirements lie, and the relatively high emphasis of around 60 percent on county and other local area data.

New Requirements as Seen by State Statisticians[8]

A separate inquiry to State Agricultural Statisticians about types of

[8] The following state agricultural statisticians replied to the inquiry: A. E. Anderson, Nebraska; William I. Bair, New York; Frank O. Black, South Carolina; K. D.

data that are wanted for states showed that many of the needs can be met by more adequate breakdowns and publication of data series already available. Often, however, there also are items wanted in states which are not available nationally and hence they need to be obtained separately if the requirements are to be met. Fortunately Census tabulations offer a useful array of state figures, many of which are also available for counties and some by minor civil divisions. State assessor's enumerations, sampling by the Department of Agriculture, and other means provide additional state material which may or may not cover items for which there are national totals. Request for more information by states as listed by statisticians include the following:

1. Minor crops
2. Crop varieties and quality
3. More detail on land use
4. Price indexes both for prices received and prices paid
5. Farm income and farm costs
6. Farm machinery and equipment
7. Fertilizer use
8. Spraying for weeds and insects
9. Marketing data
10. Farm storage capacity
11. Farm labor
12. Forestry
13. Irrigation
14. Cost of custom work
15. Farm debts and interest rates
16. Livestock losses
17. More detail on dairying
18. Breeds of livestock

To meet many of these requirements as they appear in different areas special work will be needed within the states, but in most cases resources for it are lacking. These requirements are often of a local or microcosmic charter and national totals on them may not be important from the standpoint of local needs.

For smaller subdivisions of states such as counties and minor civil divisions, we find that the requests for information received by state statisticians cover types of data that differ somewhat from the other levels. There is less emphasis upon short-time changes or trends. In most cases annual data will do. Often they may be merely breakdowns of totals available for the state and they may be important only locally. It is clear, however, that state and national totals are not enough for the man who is working with county programs and deals with county problems. Such things as detailed estimates of local crop production, animal inventories and movement to market are commonly requested. An item nearly always requested by people concerned with local data is agricultural income by counties, and this obviously cannot be computed unless a reasonably

Blood, Oklahoma; C. J. Borum, Michigan; D. O. Boster, Pennsylvania; V. C. Childs, Texas; P. J. Creer, Montana; Fred Daniels, New Mexico; J. A. Ewing, Illinois; Samuel J. Gilbert, Iowa; Russell P. Handy, West Virginia; C. J. Heltemes, North Dakota; Lester J. Hoffman, Wyoming; Alton R. Larsen, Utah; David O. Mesick, Minnesota; N. I. Nielsen, Oregon; C. D. Palmer, South Dakota; Earl L. Park, Maryland; Clarence O. Parker, Louisiana; G. A. Scott, California; Clifford Sims, New Jersey; C. D. Stevens, Massachusetts; H. M. Taylor, Virginia; Clarence C. White, Idaho; Emery C. Wilcox, Washington.

complete pattern of production, utilization and marketing data is available for the area. Such things as data on farm machinery and equipment in the counties, fertilizer use, and the like quite generally are mentioned in requests for local data received by state statisticians.

In reply to a question as to whether they had been able to undertake needed new work, about one-third of the statisticians said they had been able to do little or nothing beyond the regular national program. Some had undertaken small amounts of new work with AMA and other funds. Projects such as data on livestock marketing, poultry, and breeds of livestock were most common, but generally the amount of new work undertaken in recent years has not been large. In reply to the question of new work already undertaken in counties, most of the reporting states show only small progress in recent years. A few by using AMA and other state funds had made some headway with marketing and other data, but in all cases more needs to be done.

Statisticians were asked what work they would like to undertake if more resources were available. A major fact emphasized was that if resources were available most state offices would like to publish more fully the material that is already produced. Failure to publish all that exists is a large part of the problem. If resources permitted, a number of statisticians would like to publish not only more state reports, but also separate reports for each county to package the material for local use.

Also, if more resources were available, there is a list of items on which state statisticians would like to undertake additional work. They gave priority to the need in the states for more data on such items as:

1. Farm income
2. Livestock and other marketing data
3. Pasture production
4. Fertilizer use
5. Crop variety surveys
6. Breeds of livestock
7. Farm machinery and equipment

When it comes to local work, most statisticians would like to provide more crop and livestock estimates by counties, and a number emphasized the desire for more data on minor crops of local importance. Such items as county farm income, data on fertilizer, and feed production from pasture are nearly always mentioned.

New Requirements as Seen by County Agents

An excellent source for an appraisal of local data requirements is the county agent. Since they develop agricultural programs in their own counties their demands for data reflect requirements that arise from efforts to improve the welfare of agriculture in an area. In Wisconsin the Director of Extension appointed a committee[9] of five county agents in 1954 to work

[9] H. G. Seyforth, Chairman, L. G. Atkinson, H. L. Becker, L. J. Corey, and George Dehnert.

with the State Agricultural Statistician regarding the data that are wanted in county extension work. The committee first got suggestions from other county agents in the state and then in conference considered the suggestions.

Several points were made by the committee: (1) Not all county agents are fully aware of data that already exist and they need help in this regard; (2) Existing data are often difficult to obtain in the counties and means should be developed to make them more conveniently available; and (3) Some needed data do not exist at all and ways of providing them should be found.

Among the new items county agents asked for most often are more county data on farm income and prices of items of local importance. Also more information is wanted on farms and land use, on farm facilities and machinery, on the use of fertilizer, weed spraying, artificial breeding of livestock, grass silage, special crops of local importance, conservation practices and other items which are undergoing rapid change. It was pointed out that reports of farm numbers even by size groups are often misleading. The commercial production of farms in some areas comes from a relatively small number of farms, the others producing little of it. Here data on the farms, with the commercial output separate from the others would be useful. In some counties Extension works with part-time farmers and separate data on them would help. If such data could be had by minor civil divisions or townships, they would be still more valuable. Included in such data might be farm ownership and tenancy data by townships, and they would also be more useful if known by acreage size groups. For some local projects township data on livestock by herd sizes are wanted. It is suggested that perhaps census tabulations of these could be made.

Looking Ahead with Extension

The "Farm and Home Planning" program for which Congress has appropriated new funds to Agricultural Extension this year will focus emphasis anew on the requirements for additional data and for more geographical detail. This program is so new that it is not yet clear just how it will develop, but like other Extension programs it will be problem-centered. To help with individual farm plans in all counties will require the employment of many new workers who will study local agriculture and try to help farm families find the most profitable combinations[10] in production, marketing, and the best use of human and material resources for each farm. As this "Planned Farming" program spreads to thousands

[10] See "A New Look at Your Extension Service" by C. M. Ferguson, Director of Extension Work, U.S.D.A., *Country Gentleman*, January 1954.

of farms in each state, we may see a far reaching change in agricultural progress and increased requirements for data by small areas.[11]

In addition to this new work there are other projects under way by Extension workers which require more data by counties and by townships.[12] One way to measure the progress made by Extension efforts is to have periodic data compilations which show what has taken place over a period of time.[13] We can hardly take for granted that when the need arises the desired data will be there.[14] If the years ahead require such material in all agricultural counties of the United States, some way of providing it must be found. It can hardly be left to the haphazard developments that would come if each state develops such internal material apart from a nation-wide program.

What Can Be Done?

We believe that the foregoing material establishes the fact that in agricultural data a big frontier of unfilled requirements lies at the state, and even more, at the local or county levels. As already noted it is a matter of bringing state and local data work up to the completeness which has already been accomplished at the national level. How well are we equipped to do the job? If the situation is as we see it, certain conclusions follow:

Publication

Timely publication of available data in convenient form so that state and local material is available to those who need it is a first step in dealing with our problem. Our Wisconsin committee of county agents has pointed out, first, that they do not know all of the data that exist for their counties, and second, that existing data must be made more available. This is a big order in itself.

The work of supplying data breaks readily into two parts: (1) Collection and analysis or *input;* and (2) Publication or *output*. While at the national level an excellent input-output ratio has been developed, in state and local material the output of data has lagged seriously behind

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[11] See article "Farm Kibitzing," *The Wall Street Journal*, July 9, 1954.

[12] A specific case is the recent work of county agent F. N. Campbell of Rock County, Wisconsin. By a study of data for his county and by making comparisons with trends in nearby counties, he successfully formulated specific projects needed in his county. Then when the proposals and the same data were presented to his county agricultural committee, and others, he won unanimous approval for a program now underway.

[13] For a specific case of the use of official data to measure progress in an Extension program see University of Wisconsin Extension Service Circular 476, Page 7, regarding alfalfa acreage increase achieved in three counties.

[14] See O. V. Wells, *This Journal*, Volume XXXII, No. 4, Part 2.

collection. It has been largely left to each state and the manner in which the job is done varies among the states. In Wisconsin we have come to five main types of publications: (1) Current material such as printed monthly reports, news releases, copy for our state farm papers, etc., all of which is repeated at short intervals (Time stratification); (2) Summary bulletins of the "yearbook" type which bring together a roundup of our state and county data with time series, at rather long intervals, usually several years. These are especially useful for libraries and general reference; (3) Bulletins covering special subjects such as commodities, prices, markets, or other special subject matter; (4) Reports by counties which bring together in integrated form the data for each county in considerable historical and geographical detail. These were developed for all counties cooperatively with county agents. The stratification here is geographical; and (5) Standardized monthly study sheets for vocational agricultural classes in high schools for current data and also county study guides for more static material relating to the agricultural data by counties.[15]

Certainly to make existing material more fully available by packaging it properly for the state or county levels is a first and major requirement. To do this well, however, is a large job which often requires skills not always found in our statistical offices which have been better equipped for "input" than for "output." Adequately done, however, this meets the first two points made by the Wisconsin Committee of County Agents: (1) Help us know what data there are; and (2) Make them available in such form that we can use them. It seems that just as transportation is often a major part of military operations, so organization and publication is a major part of agricultural data service in the states.

Strengthen State Data Organizations

In most states agricultural data work is set up cooperatively between the U. S. Department of Agriculture and state agencies, mostly State Departments of Agriculture. Up to a point this has been an effective arrangement and it has brought standard procedures throughout the country. Compared with the comprehensive operation at the national level, however, the work in the states is greatly underdeveloped. Few realize how weak many state statistics offices in agriculture are compared with the work load. In various states when the national requirements are satisfied little time remains for the state and local work, and if these requirements are to be met it must be done separately in each state. Local knowledge and integration is the key to doing the job well. To produce and organize the data and the publications, an intimate knowledge of local conditions is required.

[15] See paper by E. C. Wilcox and W. H. Ebling, *This Journal*, Vol. XXXI, No. 1.

To do good state work continuity of personnel in state offices is also a requirement. Up to now it has often been difficult for men in the Federal Service to get promotions without moving from place to place. This is a handicap to developing state and local work. Men who desire to work in state and local problems are becoming more important. Unless they can be assured of continuing service in a particular state, they are reluctant to specialize in state work. Continuity of service in a location by professional personnel is a key to our problem.

Keep Complete Agricultural Census Every 5 Years

A complete census of agriculture is one of the keys to nationwide geographical detail on agriculture. Congress showed excellent judgment when it voted a full Census of Agriculture for 1954. The substitution of a sample census had been proposed but it is recognized that such a substitute for a complete census could not provide county data, and it would perhaps only provide usable state data on major items, most of which are already estimated serviceably well. Certainly from the state and local standpoint only a full census serves our larger needs even if a sample census met other needs, which is uncertain.[16]

Also, census enumerations become more valuable when fully tabulated by MCD's and counties. The Wisconsin Committee of County Agents has pointed out that for their purposes such data become more useful when both county and MCD detail can be shown. For many the vitality of the census is in its capacity to provide local detail. Tabulation by economic areas, does not provide local detail. Tabulation by economic areas, does not provide the needed geographical breakdowns, but if the tabulations are complete by county and township they can be put together to get any desired larger grouping such as economic areas. The census has done much excellent work in this connection and deserves our full support. Census cooperation with us in Wisconsin has been excellent and we have made extensive use of the MCD material.

It is noted that a committee report[17] recommends that beginning in the

[16] See paper by W. S. Woytinsky, *The American Statistician*, Volume 8, No. 1, February 1954. He says in part, "In release of statistical data based on a sample, the Bureau of Census—and some other agencies—often point out the margin of error introduced by the sampling procedure—that is, the probable maximum difference between the estimated figures and those which would have been obtained from a complete census taken at the same time, by the same enumerators, with the same schedule.

"In one respect, however, this warning falls short of its purpose. The sampling procedure is not the main source of error. Much more important is the difference in the methods of enumeration, selection of enumerators, and other conditions. A sample interview does not duplicate the psychological climate of a nationwide census, and a census cannot duplicate the conditions of a sample survey."

[17] "Appraisal of Census Programs," Report of the Intensive Review Committee of the Secretary of Commerce, February, 1954.

decade of 1960 sample censuses be taken in lieu of the quinquennial census of agriculture. This recommendation was made before the recent new agricultural extension legislation was passed. We believe it will need to be reconsidered because by then the demands for state and local data will grow to a point where the requirements for a full census are likely to be greater than ever and it is unlikely that a sample census can supply these new frontiers of need.[18] Everyone knows, of course, that even after we get the census detail by counties and MCD's a big part of the local job of integration and publication still remains to be done.

Strengthen the Cooperative Mailed Surveys

Most agricultural statisticians are convinced that properly used the cooperative mailed inquires which are already carrying so big a load can do a geat deal more. We work here mostly with people who voluntarily give us their judgment on matters about which we inquire. Most of the answers we tabulate are subjective knowledge from the minds of respondents, and greater emphasis on subject matter, service, and more attention to the non-mathematical problems of data collection is needed.[19] For example, establishing good public relations in data collection is often more important in getting successful results than a high degree of mathematical refinement in procedure. To improve data collection we need to direct more of our efforts to those things which will give the best results. Balancing input and output has helped surprisingly in Wisconsin.

Mailed surveys are low in cost and others are finding them effective.[20] It is unfortunate that in agriculture, proponents of more costly methods have caused confusion about mailed surveys. If as in extension work we begin with the actual problems, solutions of a practical nature can usually be worked out.[21] With the cooperation of local people and more effective use of mailed inquires, we can do much more than has been done. Even

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[18] See letter by E. C. Nash, Exec. Secretary Agricultural Publishers Associations, February 11, 1954. Hearings before the Committee on Appropriations, U. S. Senate, 83rd Congress, Second Session on H. R. 8067, Part I, Page 446. See also statements regarding need of full census of agriculture exhibits to the Report of the Intensive Review Committee of the Secretary of Commerce on the Programs, Policies and Procedures of the Bureau of the Census, Part I, Page 133.

[19] See paper by E. S. Woytinsky, *The American Statistician*, Volume 8, No. 1. He says in part, "The trouble with applying mathematics to statistics related to human behavior is that these statistics are not mathematical values. In some respects they are less, and in other respects more than that. They are less than mathematical values because they imply a considerable margin of error and are subject to continuous revisions. They are more than mathematical values because they are living things, must be combined with a great variety of other data, and can be interpreted in a much deeper and more flexible way than mathematical data."

[20] Samuel E. Cohen and Benjamin Lipstein, *Journal of American Statistical Ass'n.*, Volume 49, No. 266, Page 240.

[21] See C. D. Caparoon and E. A. Jorgensen, *This Journal*, Volume XXX, No. 2.

the Census of Agriculture has had substantial results by mailing out questionnaires in advance with the "self enumeration" idea. May we suggest that the high intelligence of American farmers in time may permit a census of agriculture to be taken largely by mail, thus reducing costs and perhaps improving quality?

Return Freedom of Inquiry to the States

In spite of the fact that most states contribute funds to the cooperative collection of agricultural data, they have not been as free to make needed inquiries since the war as they were before the war. Veto power over all inquiries sent to 10 or more people is held by the Budget Bureau and clearance from that agency is required on schedules for cooperative collection of agricultural data.[22] This clearance is required even though inquiries are financed mainly by state funds. This has resulted in serious delays and in refusals to grant clearance on items wanted in states. The net effect has been discouragement of state work and the suppression of free state inquiry under the cooperative structure. It has set back some AMA surveys and forced states to do work separately outside of the cooperative setup. Some state agricultural statisticians say that their experience in this regard has discouraged them from trying further to get clearance on state questionnaires. There can be no doubt that this censorship since the war over state inquiries made under the cooperative structure has set the clock of progress back seriously.

If state and local needs for farm data are to be met, full access to information through freedom of inquiry can be restored to the states by exempting from Budget Bureau clearance all inquiries intended only for obtaining state and local data. It is unbelievable that Congress ever knowingly intended to give any agency the power to withold free inquiry in states under the cooperative structure, or as one state statistician put it—"To so rewrite state agricultural questions that the original intent is lost." Perhaps the basic question is, why does anyone think this has been necessary since the war?

Research and Training

As we make further headway in the states and counties with new programs such as the new "Farm and Home Planning" work in extension, more detailed local information will be required. Extension will surely turn more to the agricultural economists to help implement the program. This should give economists an unprecedented opportunity to develop a "Functioning Farm Economics" down to the grass roots. Research is basic—first,

[22] *This Journal*, Volume XXXV, No. 5, Page 872.

to find more exactly what is needed in each area, and second, how to get needed facts and carry out the programs.

Just as Extension will be faced with the task of training new workers to carry out the big new "Farm and Home Planning" task in the counties, so the agricultural data field is faced with the problem of practical training for its men. Both will benefit by being identified more closely with Agricultural Economics. Actually the two training needs overlap. In Extension we have the main users of state and local data—in the agricultural statisticians we have producers and organizers of data for Extension and marketing use. It seems clear that to qualify men for the new work in both fields they will need to know—first, their agriculture—second, farm economics, and finally agricultural data. Nowhere can this combination be worked out as well as in departments of agricultural economics in the State Colleges and Universities.

To implement both the research and teaching required in this field may not be easy, and since the problem is far reaching it would seem that the American Farm Economic Association might well have a committee to study it. Such a committee probably should have state agricultural statisticians and state Extension workers in its membership. We think also that since the subject of providing more adequate state and local data service is national in scope it may need to be approached nationally to get the required job done. The suggested committee could reach beyond the individual state approach and lead to an over-all review that would offer a way of doing the job effectively across the nation.

PLANS FOR THE 1954 CENSUS OF AGRICULTURE

RAY HURLEY
U. S. Bureau of the Census

IN OCTOBER and November, for the sixteenth time since 1840, the Bureau of the Census will take a Nationwide Census of Agriculture. Thus, once again the farm census will provide a national, state and county inventory of farm resources and measurement of farm production and activities. It is universally recognized that the U. S. Agriculture Census provides the greatest source of facts about agriculture in the United States. The 15 agricultural censuses taken since 1840 represent a patient and large scale effort to add together a multitude of simple facts, each usually well known by a single farmer. The Agriculture Censuses by collecting, totalling and arranging these facts have provided a comprehensive picture of agriculture in the United States. Moreover the 15 National Censuses of Agriculture have provided a factual basis for looking back through the years and seeing the ever occurring changes in U. S. agriculture.

In 1952, it was recommended to Congress and Congress approved the change in the mid-decade census of agriculture from January 1955 to October 1954. The revised legislation provided some flexibility in the starting date for the censuses. The Census planned for this fall, will start in some areas during the first week of October and in other areas as late as the second week of November. Our plans call for the start of the enumeration after the completion of the major part of harvest but early enough to permit the completing of the enumeration before winter weather and difficult travel conditions develop. The fall date for enumeration will permit the taking of the census before large numbers of farm operators start changing farms and during the period when weather and travel conditions are more favorable than in either January or April.

Planning for the 1954 Census of Agriculture began more than two years ago. However, the Congress failed to provide funds for preparatory work last year and it was not until June 30 of this year that a firm decision was made to take a complete census and funds were authorized. It has been necessary, therefore, to develop plans for a 1954 census during a very short period of time. However, Congress did provide funds for a pretest sample census last year and a sample census was conducted in October and November 1953 in Utah and Virginia. This pretest for a sample census provided some useful information for planning a nationwide census this fall.

Plans for the 1954 Census of Agriculture may be conveniently outlined in four parts—namely, questionnaires, personnel, procedures, and tabulations and publications.

Questionnaires

The development of the farm census questionnaire began two years ago. At that time, the principal users of census of agriculture data, such as State Agricultural Colleges, State Departments of Agriculture, farm organizations, farm papers and others were invited to submit suggestions for the next census. As usual, the Bureau of the Census had a difficult job to reconcile demands for a large number of questions of special interest to a single group and to pare down the size of the questionnaire to fit the funds and other resources available for the job. The Bureau depended largely upon the recommendations of a special advisory committee as a basis for determining the questionnaire content. This advisory committee included representatives of the U. S. Department of Agriculture, State Agricultural Colleges, The American Farm Economic Association, The Grange, The Farm Bureau, The Farmer's Union, The National Association of Cooperatives, State Commissioners of Agriculture, Agricultural Publishers Association and the Farm Equipment Institute. This Advisory Committee weighed the importance of each question to be included in the forthcoming census and gave detailed consideration as to what data were needed, how frequently these data were needed, what data were available from other sources, and what data could be obtained by census methods. Notwithstanding the efforts of the Advisory Committee, the finished questionnaire isn't exactly bare-boned. It is printed on both sides of a sheet 19 x 22 inches.

The questions included in the 1954 Census fall into eight groups. The first group deals with farm ownership and tenure. This group is designated to secure answers to inquiries such as—how many farmers own their farms, how many farmers are tenants, how many farms are mortgaged, etc. In every recent census of agriculture, it has been essential to obtain data on the acreage and production of our farm crops. The appraisal of agricultural production and the preparation of current estimates on crop production require census crop acreage and production data for benchmarks for many items.

The third group of inquiries deal with the use of our agricultural land resources. Information will be obtained not only of the area of land used for various purposes, but also of the extent of the irrigation of farm land, in the West, the acreage and production of crops on irrigated land, and in all areas the acreage affected by soil conservation practices such as cover cropping, contouring, etc.

Inquiries regarding the inventory of livestock and the sale of livestock and livestock products compose the fourth group of questions.

Detailed information regarding the quantity and cost and use of fertilizers by crops, and the quantity and cost of lime will be obtained by a fifth group of farm census questions.

The sixth group of questions relate to the number of persons employed on farms, their hours of work and their rates of pay.

The 1954 Census of Agriculture questionnaire contains a number of inquiries relating to farm facilities and equipment—telephone, running water, electricity, TV set, home freezer, electric pig brooder, milking machines, power-feed grinders, grain combines, pick-up balers, field forage harvesters, motor trucks, tractors, automobiles and farm parts.

The eighth group of inquiries deal with farm expenditure for major items —machine hire, hired labor, feed, gasoline, etc.

The 1954 questionnaire contains several new inquiries. Data will be obtained regarding the acreage of non-cropland pasture improved by liming, fertilizing, seeding to grasses or legumes, irrigating, draining or by the controlling of weeds or brush. For the first time in Census history information will be obtained regarding the acreage of cover crops turned under for green manure in 1954 and the land planted to another crop. The inquiry on the acres of cropland used for grain or row crops farmed on the contour appears for the first time in the farm census.

Other new inquiries relate to the production of broilers and the number of turkey hens being kept for breeding in 1955.

The use of fertilizer materials as a means of supplementing the natural food supplies of the soil has become of increasing importance in the economical production of crops as well as in the proper maintenance of the soil. The 1954 questionnaire contains several new questions relating to the use of fertilizer and lime. Data are being obtained regarding the tons and cost of fertilizer and lime used as well as the acreage on which used. For fertilizer, the tons used and acres on which used are being obtained for the more important crops in each State. Questions on TV sets, field forage harvesters, electric pig brooders, and artificial ponds appear on the agriculture questionnaire for the first time.

The questionnaire is of interviewing type. Most questions are stated completely and exactly as the enumerator is expected to ask them. As the questionnaire is being mailed to farmers in advance of the enumeration most of the important instructions are printed on the questionnaire itself. In order to simplify the questionnaire, and to obtain information on crops or other items that are important in only a few states, 21 regional questionnaires will be used. Each of these questionnaires will cover part of a State, a State or a group of States.

Personnel

The second part of our plans deals with the selection and training of personnel. The taking of a nationwide Census requires the recruitment

and instruction of an army—31,000 enumerators, 2,150 crew leaders, 250 supervisors and assistants and 500—800 clerks. All personnel—enumerators, crew leaders, supervisors and clerks will be required to take and pass an examination.

Enumerators will usually be residents of the area which they will be assigned to enumerate. Most enumerators will be paid on a piece price basis plus 7 cents per mile for use of automobile. They will be paid $14 for attending training classes. Usually there will be one crew leader for every 15 enumerators and the crew leader will usually have charge of the enumerators in one county. There will be 118 supervisors and the average supervisor will have 19 crew leaders, and 260 enumerators.

Crew leaders will be given 5 days of instruction and training by members of the Washington Staff or by personnel loaned by the U. S. Department of Agriculture. Enumerators will be given 11 hours of classroom training over a period of 3 days by crew leaders.

The objective of enumerator training will be to teach the enumerator by means of film strips, "mock" interviews and home exercises, what he is to do, to give him sufficient knowledge of the questionnaire to perform acceptable work and to provide motivation so that he will do the best possible job. In order to lessen monotony, fatigue, and to obtain the maximum efficiency in learning, the training sessions will be limited to four hours each day. Before the last of his classroom training sessions, the enumerator will be required to perform one day of actual enumeration.

The instructions will be presented to enumerators in several ways in order to insure as complete as possible understanding and retention. The enumerator will observe an enumeration through the use of film strips, he will go through several "mock" enumerations in order to test his understanding, to build up his confidence in his ability to do the job and to help the crew leader determine which instructions require further explanation. Each enumerator, after his selection, will be given a home assignment of preparing a questionnaire. The completed questionnaire will be reviewed, corrected and discussed with the enumerator during his training classes.

The instructional material to be used for enumerator training will be standardized and the crew leader will be required to follow a fixed time schedule in conducting the training classes. Approximately one-fifth of the training materials will be presented by means of film strips and recordings.

Procedures

The use of self-enumeration for the farm census will be one of the important field procedures. Through the use of postoffice facilities it is planned to distribute during the week prior to the beginning of the

enumeration, to every rural boxholder, except those in six states in the South a copy of the questionnaire for the 1954 Census of Agriculture. The mail questionnaire will be accompanied by a letter requesting that the questionnaire be filled out and given to the census taker when he calls. Self enumeration was used in connection with the 1950 census. Analysis of the records of the 1950 census indicate that about 19.5 percent of the farm operators had completely filled out the agriculture questionnaire and that another 17.9 percent had partially filled out the questionnaire when the enumerator called. In 1950, the proportion of the questionnaires filled out by the farmer was larger for the larger farms than for the smaller farms. If the farmer has filled out the questionnaire by the time the Census enumerator calls, the enumerator will be required to review and check the questionnaire before he leaves the farm. In case the farmer has not completely filled the questionnaire, the enumerator will be required to fill out the questionnaire. It is very likely that the distribution of questionnaires by mail in advance of the enumeration will not only save enumerator time for farms for which the farmer has not filled out the questionnaire, but also will result in data of a higher quality as the respondent will have more time to think about his answers to questions and to consult any records that he may have.

Sampling will be used in the 1954 Census of Agriculture in about the same extent as in 1950. Information on the use of fertilizer and lime, farm labor, farm expenditures, farm facilities and equipment and farm values will be collected for all farms of 1,000 acres or more and one-fifth of the remaining farms. Farms for which the additional information is collected on a sample basis will be used for the making of cross tabulations by color and tenure of operator, type of farm and economic class of farm.

During recent farm censuses, it has become increasingly difficult for census enumerators to recognize farms and places that should be enumerated. Prior to 1950 enumerators were instructed to enumerate as farms all places containing 3 or more acres on which any agricultural products were produced and also all places under 3 acres on which $250 or more of agricultural products were produced during the year preceding the census. Enumerators experienced difficulties in applying these instructions uniformly. In 1950, all places locally called farms and all places containing 3 or more acres were enumerated. Farms and places containing 3 or more acres on which the value of farm products was $150 or more were counted as farms. Also places containing less than 3 acres and having a value of products sold of $150 or more were counted as farms. In 1954, it is planned to list all places in rural areas and to fill an agriculture questionnaire for all places locally called farms and all places on which there were agricultural

operations in 1954. It is planned to use the same criteria for counting places as farms in 1954 as in 1950.

In order to insure the completeness of coverage, census enumerators in rural areas must prepare a listing of all places on which anyone lives or any place on which no one lives, but which was used for growing crops or for grazing in 1954. In urban areas, lists of places counted as farms in 1950 have been prepared and the census enumerators will be required to visit these places and fill an agriculture questionnaire if one is required. When visiting places in urban areas, census enumerators have been instructed to ask about other farms or places containing 3 or more acres and to enumerate such places, if they have agricultural operations.

To insure the enumeration of large farms, census enumerators and crew leaders are being furnished a list of the 50,000 larger farms enumerated in 1950. The Census takers are also being furnished lists of feed lots and other similar places that are difficult for enumerators to identify as farms. In the citrus areas of Florida, Texas and California, lists of citrus groves are being prepared from assessor's and other records in advance of the census. Enumerators will be given lists of these citrus groves and required to enumerate them. In the wheat areas where a considerable proportion of the farms are operated by non-residents, enumerators will be required to map the land in farms enumerated on special township maps and to account for all land in each township.

In order to identify early in the enumeration, enumerators who may not be enumerating all places in their area, crew leaders will list 15 places in a selected one-fifth of each enumerator's assigned area. Enumerators will be required to enumerate the selected area first and the crew leader will check his list of 15 places with the places enumerated. If the enumerator has missed any places he will be given additional instructions and required to enumerate the missed places.

In approximately 1,000 counties in the plantation area of the South, a special landlord-tenant operations questionnaire will be used for the purpose of insuring the enumeration of all share tenants, to prevent the duplication in reporting by the operators of "multiple units" and component share tenants and croppers, and to provide the basis for the publication of data for multiple-unit operations.

Widespread publicity will be another aid employed in improving not only the completeness of the coverage but also the quality of the Census. The distribution of the agriculture questionnaire and its accompanying letter by mail prior to the start of the enumeration will contribute greatly to the knowledge of the census by persons living in rural areas.

Steps are being taken to call attention of farmers to the ways census in-

formation is used, the problems involved in taking a good census and the ways in which census facts affect their interests. This educational program will be fostered continually from now until November. Steps are being taken to secure the maximum cooperation of county agents and other agricultural workers in explaining the farm census and its purposes.

Tabulation and Publication of Results

Plans call for the tabulation of all items except those obtained only for a sample of farms for areas smaller than counties. Usually, these smaller-than-county areas will comprise a township or a combination of townships or similar minor civil divisions. In order to minimize the cost of the preparation of maps for use by enumerators and to reduce the cost of tabulation, minor civil divisions that do not contain a sufficient number of farms to provide work for an enumerator for two or more weeks have been combined with an adjacent minor civil division whenever possible. Data will be tabulated for the combined minor civil divisions. No plans have been made for the publication of data for areas smaller than counties and it will be necessary for users to pay the cost of compiling data for minor civil divisions.

Totals for most items will be published for each county. In the West, separate data for farm acreage and the acreage and production of crops will be published for irrigated and non-irrigated farms.

Cross tabulations of data by color and tenure of farm operator, type of farm and economic class of farms will be made only for State economic areas and published data for these cross tabulations will be based upon tabulations of data for a sample of approximately one-fifth of the farms. State economic areas were developed in cooperation with the U. S. Department of Agriculture and State Colleges for the 1950 Census. Data were published in 1950 and will be published for 1954 for 363 such State economic areas.

Farms will be classified by color and tenure of operator, type of farm and economic class on the same basis in 1954 as used for the 1950 Census. It is believed that these classifications are essential in order to segregate farms into groups on the basis of significant differences in interests, characteristics and behavior under changing conditions. These classifications will provide the basic facts for measuring and analyzing the relative importance and characteristics of various groups of farms.

The original plans for the Census provided for the publicaton of preliminary data for all States and counties by the end of December, 1955. However, Congress reduced the funds requested for the census by $2 million and unless most favorable weather and travel conditions prevail this fall and more than expected economy in field operations results in sub-

stantial savings in enumeration costs, it may be impossible to meet this time schedule. Plans call for the publication of all final reports for the 1954 census by December, 1956.

Plans are being made to appraise the completeness of the coverage of the 1954 census. This appraisal will be based upon a recheck of the enumeration in approximately 2,000 sample areas, containing about 10,000 farms. This size of sample should provide an accurate evaluation of the completeness of coverage within 1 percent of the total number of farms and land in farms. The results of this appraisal will be published as a part of the 1954 census reports.

The Bureau of the Census does not itself use the farm census data it collects. Its major interest lies in performing a dependable and reasonably accurate service. From the initial undertaking in 1840, through gradual evolution, through lessons of experience, through constructive criticism of census data users, through the piling up of demand upon demand and through increasing interest in farm problems, the farm census has grown in size and complexity. Notwithstanding the size and complexity of the job we are trying to make the farm census facts produced by the periodic census of the broadest possible usefulness to those engaged in or interested in agriculture and agricultural problems. As we go about our job, we will welcome the assistance, the criticism and the suggestions of those who use farm census information.

DISCUSSION

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The results of the surveys reported on by Mr. Ebling are extremely interesting and informative. They give concrete evidence in line with what one would expect who is familiar with the national and local statistical picture. If one were to survey a cross-section of all users of agricultural data I expect the percentage for "present uses" of national data would be somewhat higher but possibly not greatly above that reported by state Directors of Extension. The Table 1 results of the survey of Agricultural Statisticians seem to be biased toward State and county data. I am using the term county loosely to cover all statistics for areas below the State level. As a Statistician, I believe this is tied largely to the way the question was put. It asked that the State Statistician's estimates be based on "requests received in the office for agricultural data (whether available or not)." Certainly this interpretation would give somewhat different results than the type of question put to County Agricultural Agents and Extension Directors which asked them to base their estimate on the statistical data now used. Requests for data are not always an adequate measure of use. Part of the lower percentage for national data is directly related to the fact that the statistical data coverage is much more complete at the national level than at the State or county level as Ebling points out. This is also borne out when one compares the results in Table 1 and Table 2. The latter shows a sig-

nificant increase toward county data, particularly, when the question relates to data not now available. In fact, the percentages for State data decreases in 3 out of the 4 surveys (County Agents show 27.5 and 27.6) with the national percentages down in each case. The straight average percentage of the results of the 4 surveys reported in Table 1 is 34.6 for State data which drops to 27.7 in Table 2. The average for national data drops from 19.0 percent in Table 1 to 12.6 in Table 2. The average for "county" data increases from 46.4 to 59.7 percent. Perhaps this is taking unfair advantage of the data presented but it does show that the greatest unfilled demand for agricultural statistics relates to areas below the State level. We are fully aware of this in the Agricultural Marketing Service in Washington and have been pressing for years for more adequate county or local area estimates. Much of what is available at this level has developed out of the cooperative arrangements with State agencies–Departments of Agriculture and Agricultural Colleges–which now cover 41 States.

Many of the fields of new work listed for the State or county level have high priorities at the national level also. Frequent requests are received to institute a national reporting service on pasture production, land use, grass silage production, fertilizer use in total and on individual crops, irrigated and dryland crop acreages and production, breeds of livestock, varieties of crops, farm income and expenses, more minor crops and most of the other items mentioned. These and many others come up for consideration when there are opportunities for expansion or adjustment in the current program. Some have been hanging fire for years and there is little that can be done unless funds and facilities are made available for adding the service. Each one requires new or additional inquiries and analysis.

Recently the Joint Committee of Congress on the Economic Report issued a progress report[1] prepared by its Subcommittee on Economic Statistics. Among its preliminary findings and recommendations is this. I quote "The principal stumbling block to providing an adequate economic statistical program is the lack of financial support." The sub-committee goes on to say that it realizes the importance of economy in Government and appreciates the need for carefully screening requests for statistical improvements and for efficient planning of statistical programs to avoid duplication of effort, harrassment of suppliers of data as well as waste and extravagance generally, but that in the light of the need for adequate statistics, past economies have gone too far. This statement was applied to the broad field of economic statistics but it is certainly also true in the field of agricultural statistics.

How can adequate financial support for more county and State data be secured? Before much progress can be made, there must be an increasing awareness of the need for and use of such data. At present, the availability of local data in readily usable form varies greatly by States just as the resources vary. Wisconsin has, perhaps, done more in the way of making such data available through its varied types of publications than any other State but others are beginning to follow that lead. I would expect the new "Farm and Home Planning" work to speed up the move. It has been suggested that a Committee be set up by this Association to study ways of implementing both the research and training that this new program will require. I hope that "research" includes the collection of statistics. If not, this should be added to

[1] House of Representatives Report No. 2628.

the field of study because statistics are the basic tools on which research is based. Without the necessary statistical expansion, increased economic research will be limited. All too often new research programs are planned and provided for with little or no provision for the statistics required. They seem to be taken for granted.

In the past, county and, to a certain extent, State statistics have been considered to be the responsibility of the State and local governments rather than the National government, except where the administration of national programs is concerned. In Agricultural Estimates we have been able to provide some coordination and consultation through the cooperative arrangements with the State Departments of Agriculture and in some cases the Colleges of Agriculture. The matching fund provisions for research and services under the Agricultural Marketing Act provisions have aided greatly in a number of States in expanding the statistical service at the local level. This or a similar program could provide for further expansion in the agricultural statistics field although the extent may be conditioned by the availability of matching funds in each individual State. Perhaps certain types of local statistics can be completely supported by Federal funds but progress here is likely to be slow, unless a general nationwide need develops as the result of other programs.

In the Agricultural Estimates Division there is a foundation on which to build any general program undertaken to increase the scope and coverage of local data. Cooperation already exists with the responsible State agency and there is a State Agricultural Statistician's office located in each important State presently engaged in the collection and publication of agricultural data. These offices are experienced in bringing together and integrating agricultural statistics from many sources. Any expansion of local statistics, however, whether financed by State or national funds or both, must be supported by "knowing" people within the State, based on known needs or uses for the new data. This support must come largely from outside those engaged in the collection of agricultural Statistics. In many States this may require an educational program.

I would like to comment briefly on the clearance of inquiries by the Bureau of the Budget. It is true that such clearance is required whenever any Federal funds are concerned in the project even though it may only be the use of the frank. We have had some problems arising out of this procedure, particularly where State inquiries were involved but these are gradually smoothing out. Some central coordination of statistics is necessary in a Government as large as ours. In Agricultural Estimates all inquiries were submitted to the Washington office for review and suggestions even before the present central clearance procedure was established. The problem lies largely in getting such review too far removed from the operating level and in the failure to apply equal requirements to all agencies. This tends to restrict unduly those agencies which submit every inquiry for clearance while others compete for the respondent's time with little or no review coordination.

Hurley and those working with him in the Bureau of the Census should be commended for the progress they have made in arrangements for the 1954 Census of Agriculture. This represents an outstanding piece of work in view of the lateness with which some decisions were made and funds provided. Few realize the immense amount of planning and work required to provide for a Census.

The USDA actively supported the taking of a complete Census of Agriculture

in 1954 rather than a sample Census as was proposed in the 1955 budget. Many of us were concerned about the usefulness of a sample of the size discussed as a benchmark for current State estimates as well as about the loss of county and MCD data which a sample census would not provide. As you know, the Agriculture Estimates Division uses the 5-year Census of Agriculture as benchmark data, trueing up its year to year estimates which are based on sample surveys supplemented by check data. This also provides a corrected series on which to base future estimates. It is interesting to note that the report of the joint committee mentioned earlier included among its recommendations one calling for adequate and timely benchmark data from regular censuses of Agriculture, business, manufacture, etc., pointing out that these benchmark statistics have more significance than just their contribution to historical research. They are the foundation of an adequate program of economic statistics.

Even though Agricultural Censuses have furnished a foundation for many of our statistical estimates, a number of problems arise in using these data. In many cases, the raw census data must be interpreted or integrated with other data to furnish a satisfactory base on which to build. This is true at the county level as well as the national level.

The October beginning date of enumeration brings in some new problems. For livestock, we have always had the problem of adjusting the inventory to a January 1 date for Censuses taken as of another date. The period between October and January 1, however, is one of extremely heavy marketings and shifting of livestock from producing to feeding areas. With staggered enumeration dates some of these livestock can be counted twice but in different States. By working closely with Hurley, we believe a method has been developed which can be used to adjust census inventory totals by States to a January 1 base. This will involve a mailed inquiry to a sample of livestock producers about January 1, 1955 with some enumeration of non-respondents and measuring the change to that date by matching with census returns. We will have some problems in interpreting totals for crops also. Not all late growing crops will be harvested by the time of enumeration and there may be some question as to the completeness of the totals. This is not expected to be serious for most areas, however, and the experience gained in late 1953 in Virginia and Utah, working in cooperation with the Census Bureau on the sample Census pre-test, will be helpful. The change in timing will probably affect the comparability of other items also but these will not be fully known until the Census results are in. The totals for some items should be improved by a fall Census.

It is impossible to say now when revision will be made in the annual crop and livestock estimates. We had hoped that 1954 Census results would become available rapidly enough so that crop revisions could be published in December 1955 and livestock revisions in February 1956. Judging from Hurley's time table, it is doubtful if Census tabulations for all States will be available in time to meet these dates.

Considerable mention was made in the first paper of the need for Agricultural Statistics for areas smaller than a county, such as the township. Hurley mentioned combination of townships or MCD's into enumeration districts to minimize certain costs. This will mean that 1954 census totals will not be readily available for all individual MCD's even in unpublished form. The initial tabulations will be for the enumeration district where MCD's have been combined. This will make it more difficult to secure census data by MCD's in some areas and the cost of such data will be greater than in the past since it will involve a

retabulation of data for combined minor civil divisions. The effect of such combinations in the detail available will vary considerably in the different parts of the country. I would expect that the cost of MCD tabulations would be decreased if arrangements could be made for complete breakdowns in advance of initial tabulations. Where the need is already apparent it would be well to present this problem to the Census Bureau now.

DISCUSSION

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In my discussion of the two papers just presented, I wish to point out that my comments are based upon the use made of census and agricultural data in carrying out an Extension Economics Program. My remarks also reflect the thinking of County Agents and others with whom I work in New Jersey. Some other thoughts and opinions will be added which are indeed personal. Perhaps some of them will stimulate further group discussion.

The first comments are about Mr. Hurley's paper. It pleases me to learn that a complete census will be taken this year. Certainly there is a need for complete enumeration for civil divisions, county and state, if we are to effectively develop Farm and Home Planning.

Hurley has described the mechanics of taking the 1954 census as closely resembling the 1950 census. If the results obtained are no better than the last census for our state, then I shall be sadly disappointed. Under the present system of hiring enumerators, there are grave doubts in my mind that it will be much better. I do hope the test given to enumerators will weed out those ill-equipped to do a good job of enumeration. With a budget of only 16 million dollars to do such an enormous task, we cannot expect too much. What might appear to be a cheap census is really false economy in the long run. I would like to have you speculate with me as to the number of man hours spent every year by professional people adjusting, doctoring, and qualifying census data. Let me cite you one example—the number of census farms versus the number of commercial farms. I shall not attempt a numerical estimate of these wasted but expensive man hours.

Let me now turn my attention to the paper read by Dr. Ebling. In general, I agree with its content because it checks so closely with my experience and use in Economics Extension work. It is clearly evident from the survey Dr. Ebling made of Extension Directors, Vo-Ag Supervisors, and County Agents that more and better county and state data can be effectively used. I hold before you the most used publications taken from the top of my desk. These simple publications of charts and tables are useful because they contain agricultural data on a county and state level. Many requests for such information come by telephone, so I keep these particular publications handy.

But even these publications are inadequate to answer many requests for county figures. To point this up, let me relate a story about the telephone call I received from a County Agent in the southern part of our state last week. He began like this . . . "I hate to admit this, but can you tell me how many acres of asparagus are grown in my county?" . . . He went on to say . . . "the latest figures I have in my files are for 1948. I know the acreage has increased since then. I am writing up a report and would like to include the latest figures available."

The conversation ended with a promise from me that I would call him back to supply the missing county data. My next step was to call our State Statistician at Trenton. He gave me the 1953 estimate of acreage, yield, and production of asparagus for fresh market and processing. I relayed this unpublished data by telephone to the County Agent. This story is related to you because it happens quite frequently and points up one of the statements in the paper; that is, there are valuable county data which remain unpublished in the State Statistician's office because funds and personnel are too limited to do a thorough and fully integrated job.

It is interesting to review the section of this paper, "Looking Ahead With Extension," which is so closely tied to Farm and Home Planning. I agree with the statements made that much more local data will be necessary on production, yields, prices, and costs if County Agents are to do effective work with individual farm plans.

Let me summarize the recommendations of this paper. Unpublished county and state data which lie dormant in the files of the State Statistician could be used if more funds and personnel were available. This could be accomplished if we strengthen cooperative relationships between state agencies and the United States Department of Agriculture. We should demand that the free use of the mail inquiry be returned to the States. A broadened research program in finding better ways of getting agricultural data should have federal support and be coordinated with a cooperative study arrangement with Departments of Agricultural Economics at Land Grant Colleges. It was also recommended that a committee appointed by the American Farm Economic Association be given the task of studying the situation.

My own closing suggestion is this . . . The Federal government could well afford to increase its appropriations to place a trained statistician in every county. He might be called a "County Statistician." He could be housed with the County Extension Service or have separate office space in the same public building. His duties would be gathering and dispensing county data. His goal might be . . . an equivalent county census of agriculture every year. I would anticipate that it would take a few years to achieve that goal. How much would such a program cost? I am not prepared to make any estimates. I do presume such a program would cost much more than we are spending at the present time. County and State governments should help finance the job like they do for Extension. But to have a "County Statistician" gathering and dispensing local information on intentions to plant, acreage and growing conditions during the summer months, and a full enumeration of acreages, production, and local farm prices would be a great help to farmers in making their yearly plans and adjustments. Many farmers could use such local data so effectively that there would be less need for Extension to give them individual counseling in farm and home planning. The facts developed by the "County Statistician" are certain to be of great value directly to the Farm and Home Planning project. Perhaps it would be a wiser use of Federal funds to develop the county data more adequately before expanding Farm and Home Planning too far.

GRADUATE STUDENT SECTION

Chairman: Bennett S. White, Agricultural Marketing Service

GENERALIZATION VERSUS SPECIALIZATION IN GRADUATE TRAINING

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What Is Specialization?

THERE seem to be various strata of specialization—we can think of the specialist in agricultural economics as one who has concentrated his efforts on the logic of the science of economics and the application of its laws and principles to agricultural problems. Again specialization has been thought of in regard to the direction in which one applies the tools of economics, either to the questions of public policy, production or consumption, and marketing. Probably to facilitate administration, the latter area is frequently subdivided according to commodities. While the institutional aspects of marketing individual commodities may differ the analytical techniques are the same. Individuals who concern themselves with marketing of potatoes or with marketing of butter may become institutional specialists but the analytical tools which they use and their application of economic principles must be the same. Again the same economic logic applies in determining the amount of grain to feed to a dairy cow or the amount of fertilizer to apply to corn. There are, of course, functional differences between feeding dairy cows and applying fertilizer to corn. However, the agricultural economist need not be concerned with the physiology of the cow or the cultivation of corn. But he is concerned with the relative profitability of applying limited resources to each alternative opportunity on the farm and he is concerned with the elasticity of demand for each commodity produced on the farm. One cannot make a meaningful separation of economic logic either on the basis of its application to enterprises or to commodities or even to resources. Therefore, we will think of specialization in agricultural economics neither in terms of farm commodities nor agricultural enterprises nor resources.

Differences in the application of the science begin to emerge when we compare the problems of production with the problems of marketing in that production functions are the main concern on the one hand while demand is basic to the other. Thus, from an investigational point of view there seems to be some reason for an agricultural economist pursuing one or the other course. He may choose to concentrate on production economics in which case the marginal relationships between factors, between products and between factor and product became essential areas of investi-

gation. The marketing economist will become involved in studies of demand and elasticity of demand to a large extent. Or, if we think of specialization in public policy, the allocation of resources and the distribution of income become the main concerns. While demarking the areas of public policy, production and marketing is useful from an investigational point of view, we may have strong doubt that a graduate training program should encourage a student to restrict himself entirely to any one of the three. The production economist must be aware of the consequences of his recommendations in the market and the policy economist must be aware of producers' or farmers' reactions to price changes, that is, to elasticities of supply.

What, then, is specialization in agricultural economics? It is contended that specialization is not meaningful on the basis of either commodities, enterprises or resources because the laws and principles of economics apply in the same way to each farm commodity, to each enterprise and to each resource. The investigational techniques differ in analysing problems of production, problems of marketing and problems of public policy because the theoretical and empirical tools are different. However, the consequences of each (that is, production, marketing and public policy) upon the others make it unreasonable for a graduate program to ignore any one of the three.

In summary, then, it is contended that a specialized training is one in which attention is directed to agricultural economics in total. The same investigational tools of economics are used for examining the marketing problems of all commodities, the same economic considerations of resource allocation are involved in each farm enterprise and the same economic considerations are relevant for each resource used in agricultural production. While it is recognized that the theoretical and empirical tools used by the production economist, the marketing economist and the economist of public policy differ to some extent (and for this reason investigators in the profession may choose to concentrate their energies on one or another area) a student cannot ignore any of the theory or empirical tools which are relevant to agricultural economics. Agricultural economics is itself a specialized area in graduate education. It is supposed, of course, that any graduate program in agricultural economics will include a strong central core of economic theory. It would be hard to conceive of a curriculum in economics which did not include the logic of the science.

A Generalized Graduate Program

If we think of a specialized training in agricultural economics as being one in which the theoretical and empirical techniques used by agricultural

economists are emphasized, how may a generalized program be defined. Certainly a wider variety of disciplines may be included. In such a program the criterion might be that knowledge for its own sake is good whether or not it leads directly to the solution of a problem of the day. Such a program tends to be aesthetic and the student who completes such a training becomes more of a social scientist than an economist although the central core of the training is economics. That is, economic theory will be included but its immediate relevance to agricultural problems will be of less concern. I would expect that empirical techniques and research methodology would be treated rather lightly if at all. However, other disciplines with varying degrees of relevance to agricultural problems would be included such as philosophy, sociology, logic, mathematics, agronomy and others. The objective, simply stated, would be the training of "an educated man." The very specialized program, on the other hand, tends to be highly pragmatic—the courses are intended to provide a set of tools for the student, that is, acquaint him with the then known techniques for solving economic problems in agriculture.

What criteria can be used to decide the direction which graduate training should take between these extremes?

A substantial investment is made by society each year to provide instruction and research facilities for graduate students in agricultural economics—what, then, are the wishes of society in regard to the training of these students? Farmers and their organizations, as well as legislators, see specific problems in the agricultural industry—they are interested in how crops and livestock products can be increased from a given set of resources, how surpluses can be disposed of profitably and how incomes can be stabilized in agriculture. The agricultural economist is being asked to find immediate answers to these problems. Certainly a pragmatic approach to graduate training would be favored by society so that the student will be equipped with techniques which have relevance to the problems of the hour.

In the past, agricultural economists have concerned themselves to a large extent with describing the industry and discussing the general economic state of agriculture. However, comparatively little has been done in making specific recommendations to farmers. I suggest that this deficit has resulted from a rather high degree of generality in the training of agricultural economists. They have not been able to apply economic theory to the farm firm nor to farm firms in aggregate. Certainly, since we are concerned with efficiency, we must recognize how little has been done to improve economic efficiency in the farm firm.

What opinions do graduate students hold? A student who has indicated a willingness to invest several years of his time in formal study as well

as a considerable money investment must have established rather clearly in his own mind a professional interest area. It should not be necessary, therefore, to influence the study program in any way due to the possibility of his subsequently desiring to withdraw from the field. The best training which can be given for a career in agricultural economics will be in the student's best interest.

Having a clearly established interest area, the greatest professional satisfaction will come to the graduate in agriculture economics from being able to recognize problems and search for meaningful solutions. This objective calls for a specialized training. The student must know the logic of his science and the techniques of its application to agricultural problems. There seems to be a wide gap between an understanding of the marginal concepts, for example, and finding the optimum level of fertilization or the optimum level of feeding grain to dairy cows. I suggest that a rather considerable injustice has been done a student who hasn't been shown, in his graduate study, the methods of applying the laws and principles of economic theory to agricultural problems.

I think that most students, certainly all with whom I have discussed this question, seek to be tool users in the early years of a career in agricultural economics. Again, what we have termed the specialized or pragmatic approach in graduate training is recommended. It is on this basis that I think we can criticize the program which directs the student to "a general grasp of the subject matter of a large field of study." Neither the direction nor the mode of travel is suggested to the student setting out on the unfamiliar road of research in agricultural economics.

I think it is interesting to recall briefly the emphasis which was intended when the levels of learning were originally graduated as we are familiar with them today. Apparently the bachelor's and master's degrees had been offered for some time before the first doctorate was awarded at Bologna. The bachelor's degree recognized the attainment of a broad training while the master's degree seems to have been awarded mainly for scholarly conduct, over a period of years, to those who had the bachelor's degree. The doctor's degree was awarded, originally in law, to those who increased the stock of knowledge either by adding to it or by bringing fresh and significant interpretation of known facts. The number of fields of endeavor for which the doctor's degree is offered has increased substantially over the years and the basis on which it is offered has changed substantially. Only infrequently do Ph.D. theses increase the stock of knowledge by adding to it, that is, by adding new theory. More often they apply known techniques to a problem that hasn't been analysed previously in that way or they make an economic analysis of some existing situation or industry, or again describe some situation which has

economic relevance. In any case, only a small area of knowledge is involved. Most college and university catalogues emphasize significant attainment in a specialized area as being the main requirement for the Ph.D. degree.

It may be said, that specialization will lead to an unnecessary degree of narrowness in the total college training. However, it must be kept in mind that most graduate students have been exposed to four academic years of undergraduate training in which a wide range of agricultural sciences and other disciplines have been examined at least. Not many years ago the entire undergraduate program was concerned with a highly standardized broad training. And not until the end of the undergraduate period was a student expected to select an area of specialization—if he did choose to specialize at all. In most recent years the student is encouraged or required to select a specialized curriculum at the outset of his college training or certainly not later than the second year. It must be the assumption that students' objectives become crystallized at an earlier age or that the need for specialization is becoming more acute.

A strong case can be made for a specialized graduate training program when one considers the demands of society upon agricultural economists and also the desire of the individuals themselves to acquire a training which will facilitate their making a professional contribution at an early age. However, the organization of a specialized program is not without difficulties. A problem which must be as thoroughly vexing to educators as it is to students is deciding what are the essential techniques and to what extent must they be supported by disciplines other than economics. It was suggested that the specialized program should emphasize economic theory. But we know that there is a vast amount of material in this area, far more than one can include in a period of graduate study. Thus it becomes the responsibility of the graduate department or professor in charge to select the material which he thinks will be most beneficial to the agricultural economist. This, of course, cannot be static but must change over time as new concepts are developed. Probably the strongest criticism of the theory portion of a graduate curriculum is that it may become sterile and thus contribute little or nothing to the agricultural economists' analytical devices. As a consequence, theory in some instances becomes looked upon by students as a hurdle over which one must climb before reaching the useful parts of his program. I think in many instances this is an indictment against generalization which, in attempting to develop "the educated man" invests heavily in the work of the Physiocrats, for example, and gives indifference analysis a scanty consideration.

In order that a graduate curriculum continue to be specialized the new and relevant theories and techniques which are developed from time

to time must be added. Input-output analysis and linear programming are useful examples of new empirical devices which have become available to the economist in recent times.

So far as supporting disciplines are concerned certainly statistics would be included as an essential for the agricultural economist. Other supporting courses may be included—the criterion being "do they contribute to the professionally usable part of the student's graduate training." The application of economic logic to agricultural problems will be a final essential of the specialized program.

It was not the intention to make a detailed statement of what might be included in the specialized program other than to say that the most relevant theory and techniques are a must. Statistics is a most essential supporting discipline, other areas of study may also be important to students who are interested in particular applications. In any case, the intent of the graduate training will be the equipping of a student so that he knows the techniques which are available and furthermore he knows how to apply them to obtain meaningful answers for agriculture.

However, specialized training comes at a price and while I would recommend a specialized graduate training I recognize that the price is high. I feel that in the long run the person with graduate training must aspire to being more than a technician, not only from the aesthetic point of view or the satisfaction which one must derive from having acquired riches in knowledge but also from a professional advantage. Economic problems are seldom found in complete isolation. The economic answer to a problem frequently has political, sociological or other ramifications. The economist will be handicapped, therefore, without some knowledge of these sciences.

I am led to recommend a specialized graduate training because one cannot acquire a good knowledge of the theoretical and empirical tools of economics and their supporting sciences as well as a variety of other disciplines in the two or three years spent in graduate training. If the opportunity cost of a generalized training to the graduate student is the loss of training in the empirical tools of economics, and I think that is usually true, then I suggest the cost is too high.

Some specific criticisms of specialized training have come to my attention. It is contended by some that the objectives of graduate study should be the turning out of "an educated man." It is said that breadth of knowledge is required both within one's chosen field and in other disciplines. A person should not be "just an economist" but also something of a philosopher, a sociologist, a linguist, and so forth. The most usually heard defense of the language requirement, for example, is that it is somehow wrong for a student to complete graduate training and know

only one language. I have not heard it seriously contended that otherwise unavailable information is uncovered for the student when he accomplishes his foreign language requirement.

Let me emphasize again that it is not contended that a knowledge of foreign languages or philosophy, sociology, etc. is a handicap to a professional economist. On the contrary the more knowledge one can acquire the better equipped he is to make a useful contribution to society. It is suggested that considering the vast amount of theory which is relevant to the problems of an agricultural economist, the variety of empirical devices and statistical methods and the necessity for experience in relating these to agricultural problems the student is ill advised in diverting much time from his short period of graduate study to areas of learning which do not bear directly on the immediate problems of agriculture.

I think we must assume that the learning process will continue indefinitely. The theory and empirical techniques which are most difficult to acquire by oneself should be included in the formal graduate training. Disciplines which are less directly concerned with agricultural economic investigation and are more easily acquired by oneself should be delayed to a later time. It is highly desirable, however, that a student will have both the time and desire to investigate sciences other than economics after his period of formal graduate study.

If it is said that the specialized training does not equip a student to become an investigator, I think this is wrong. A student who is thoroughly familiar with the logic of his science is well equipped to recognize problems in his field, to formulate hypotheses and develop meaningful answers. Starting out his career in this way will make him better able to understand and more aware of the necessity for keeping up with the new developments in the science.

As was suggested earlier, the criticism is occasionally made of specialized training that the student is handicapped if later he chooses to change fields. This would only be a valid arguement if the degree of specialization was narrowed to the point where a student concerned himself with the economics of a commodity, an enterprise or a resource. It has been indicated that specialization to this extent is not meaningful since the same laws and principles apply regardless of commodity, enterprise or resource.

In conclusion it may be said that specialization will provide the graduate student with theory and techniques which can be employed directly in obtaining meaningful answers to economic problems in agriculture. It is a vocational training in the highest sense of the word, designed to give a student with a clearly defined interest area the most relevant techniques for solving the problems of his profession.

DISCUSSION

ALBERT N. HALTER
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Educational Ends

In his paper on philosophy of graduate training Mr. Bowlen's comments concerning the ends or objectives of a graduate training were the first to stir me to disagreement. Although it is not explicitly stated Bowlen implies that the specialized training will produce a problem solving individual, while a generalized training will result in an "educated man." There is no apparent reason why this precise input-output relationship should result, i.e., a widely accomplished individual might also be the product of a specialized program while the product of a generalized program could be an individual of limited horizon. I believe the result depends more upon the individual and his goals, than it does upon the courses that he passes.

It perhaps would have been more appropriate to compare the relative merits of the two means of graduate training as they contribute toward the same end or goal. But this immediately brings the question to mind: What is this goal? If the end of all education is not Life in all its manifestations then we as graduate students are pursuing an aimless course of endeavor.

If it can be agreed that this end is not folly, then one is in a position to criticize the means of attaining it.

Means to Ends

Bowlen says that a specialized training in agricultural economics imparts to the student the theoretical and empirical techniques he will need to persist as a member of that profession. Without ideas economic theory may become nothing but formulated statements of economic truths, while the empirical techniques of which he speaks may degenerate into mechanical mental aptitudes. The imparting of these qualities through a graduate program admittedly should lead to much activity, amid aimless re-arrangement of syllabuses, in the fruitless endeavor to dodge the inevitable lack of time. Paralysis of thought would be the result of this aimless accumulation of precise knowledge, inert and unutilized.

You can not divide the seamless coat of learning. I am pleased that the author presents agricultural economics as a unified science. Although he mentioned some of the interrelationships between production, marketing and policy he deleted supply analysis, and managerial economics, the latter draws from all phases of agricultural economics as well as the disciplines of sociology, psychology, political science, philosophy and religion.

Even if we are to accept Bowlen's distinction between a specialized and a generalized agricultural economist it would be difficult to conceive of a problem solving individual without mathematics as one of his empirical tools. A generalist equipped with the logic and tools of mathematics would be better able to cope with real problems than his specialist. What can the specialist take besides economic theory and statistics? What is the best training to which the author refers?

What a graduate training should impart is an intimate sense of the power, structure and beauty of ideas, together with a knowledge of the general body of thought which has particular reference to the life of the person possessing it.

I infer that Bowlen considers the learning process analogous to watching the open pages of a mountain of books, on occasion arising, the right page is selected and read aloud to the audience.

Training Educators

Graduate programs, unlike the one Bowlen presents, can train educators rather than mere agricultural economists. The educator is part scientist and part teacher. As a scientist he is interested in employing the art of thought, as a teacher he is interested in bestowing the art of thought on others. It is essential that the educator know the generality of method and be able to contrast it with the speciality of the particular application. A man who only knows his own science does not even know that. His thought lacks the leavening of other disciplines and he is devoid of channels of alien ideas. He will discover nothing and be ignorant in practical application.

Bowlen has tackled a difficult and variable problem in attempting to delineate courses that every graduate student in agricultural economics should be required to master. One cannot say explicitly that every person needs the same equipment for life. I wish to avoid falling into this pitfall; but, in passing I wish to remind Bowlen that basic to indifference analysis is the value theory of philosophy, basic to production function analysis is the simplifying logic of mathematics, and basic to the scientific method is a philosophy of science and the entire body of deductive processes called formal logic.

Generalization of subject matter and specialization in scientific method is the distinction I am prepared to draw. The entire graduate program can not be ether generalized or specialized, it must be both. Specialized in the art of thought that is common to all the disciplines, generalized in subject matter, for it is the intercourse of ideas with productive thinking that will bring solutions to the problems of society.

DISCUSSION

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Should graduate training programs in agricultural economics aim at turning out a "specialist" or an "educated man?" That is the question looked at in the paper presented by Mr. Bowlen.

Bowlen has chosen to define a specialist as being one trained in all phases of economics including production, marketing and public policy. In such a program emphasis is placed on the theoretical and empirical techniques used by agricultural economists. Supporting course work related to the field is included in the program.

The generalized program is defined as one in which a student receives a broader type of training. This includes such areas which may relate to agriculture as philosophy, sociology, logic, mathematics, agronomy and others. Economics is touched upon but its application to agricultural problems is treated with less concern. Research methodology may be excluded entirely. Problems would not be approached with the same techniques as used by one more highly trained in economics. Emphasis is placed on turning out the "educated man."

On the basis of these definitions I would agree with Bowlen in his conclusion that a specialized training program is the one toward which we should aim. It

equips the student with the knowledge and tools for recognizing, analyzing and solving economic problems in agriculture. This does not imply that such a program will supply the student with a tool kit from which he can merely select the proper tool and fix the trouble spot. Nor does it imply that he should become all wrapped up in his tools or theory and forget the problem. He will be called upon to use vision and thought in his probem solving and must always keep in mind the direction and goal for which he is headed.

A question raised in the paper relates to what society expects of the agricultural economist. If it expects him to be capable of handling the economic problems how can he better meet the demands than by training himself thoroughly in the field? Again we might ask what are the qualifications for which a farm group, university, industry or the government look when hiring an agricultural economist? Generally they look for those qualifications which we find in one who has had a "specialized" training rather than the "educated man." No doubt they would prefer a specialist who has also had considerable training in the broader fields, but, as has been pointed out in the paper, the period of training for the graduate is a limiting factor.

A student does not seriously limit his future professional undertakings by specializing. We may assume that by the time a student has started his graduate program he knows in which direction he wants to move. He should try to get into the best program that will fill his needs and not worry about limiting himself by specializing.

If we can agree that a specialized program, as defined before, equips the student more thoroughly with the proper tools and techniques for the analysis of problems, and is preferred by society, we might go one step further. Perhaps we could redefine specialization and generalization in terms of degree of concentration on one of the phases of agricultural economics, such as production, marketing or public policy. Bowlen eliminated this possibility as a definition of specialization because they represent differences in applications of economics. He did mention that some of the tools used in these three phases differ to some extent.

In this situation generalization may be defined as a broad training in agricultural economics, including equal attention to production, marketing and public policy. Specialization may be thought of as a degree of concentration in one of these areas. A highly specialized program of this nature is not desirable. Agricultural economics in total is a specialized field in itself. A student should be capable of demonstrating his ability in all phases of agricultural economics. However, it is true that a student tends to concentrate in one direction when he works on his research paper. Further concentration develops if all his work is centered around a single commodity. While this situation cannot be avoided entirely, the program can be adjusted to meet his other needs.

It is not essential for an agricultural economist to know about the physiology of the cow. However, if one is dealing with a commodity and understanding of that commodity will be useful in planning research and avoiding impractical recommendations. We can assume, however, that this phase is generally a part of the undergraduate training and not of particular consequence in the graduate program.

Another point which comes up for consideration is the extent to which theory is required in the graduate program. While we must recognize the value of theory in attacking and solving economic problems, we cannot allow theory to be the complete dominating force. One can go overboard on theory and lose

sight of land just as one can go overboard in the opposite direction. Learning to recognize limitations as well as usefulness of theory is one of the important contributions of a sound program.

When we get into the area of supporting disciplines other than economics, statistics is mentioned as an important one. We will probably all agree on this. But if the criterion for supporting courses is "do they contribute to the professionally usable part of the student's graduate training" we are leaving the door wide open. At this point we could get into a discussion of the relative importance of various courses in contributing to the training of the graduate. We do recognize its general importance.

A graduate training program in agricultural economics must prepare a student for his role in society. A specialized type of training will best equip the student for that role. Just how far this program of specialization should go, and what should be included in it, is rather vague and needs more careful consideration.

NEW HORIZONS IN AGRICULTURAL ECONOMICS

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THE term "horizon" has been used in many different ways. I checked the dictionary to see if the word could be clarified a bit. "The line of apparent meeting of the earth and sky" was the first definition. Another was "a bed or limited number of beds characterized by one or more distinctive fossils"; I wondered if this were a little more nearly related to what I might be expected to write about. "The bounds of observation or experience," was still another definition.

New experiences, or new developments, actually seem to best describe the title of "New Horizons in the Field of Agricultural Economics." Another way of saying it might be, "What to expect in the field." When it's all said and done nearly all new experiences are merely things that have evolved from old experiences.

One who looks into the future should have considerable acquaintance with past developments in any particular field. Even then predictions might well be wrong. This probably may account for the fact that the subject was assigned to a graduate student not long in the field. He should not be judged too critically if some of the new horizons he sees turn out to be merely clouds of dust.

In looking more closely at some new experiences that may be encountered I chose to divide them into two distinct types. First, those developments that will come about only through increased efforts of economists themselves. The other type categorizes those developments which are inevitable. Agricultural economists will either observe, anticipate, and consider developments of this second type or be left out of the passing show.

Need More Dynamic Theories

Let's look at these types, one at a time. First, those horizons which need encouragement of economists to develop. Near the top of this list I would mention the necessity of developing and using more workable, dynamic theories upon which to base judgments.

This is not to say that our present approaches to research are bad or should be discarded. Perhaps it is not that the theories are poor. Logically they must be correct if we grant the assumptions accompanying them. However, often we still remove ourselves a considerable distance from reality by assuming things that just are not even close to being the situation. The term "all other things being equal" may be overworked.

A challenge for us is to find what happens when all things do not remain equal. It will be a slow process—and a tedious one; first perhaps

relaxing one assumption, then another, etc. Again the dilemma has not been in the theories themselves but in their application. Progress toward improvement in application is already evident in some places.

Without doubt there are many new theories and models waiting to be developed. It is our challange not to let that element of "finality" creep into our thinking. From what I understand ours is a relatively new science. Our friends in the physical sciences have been developing their field considerably longer. They are finding out many new things as evidenced by our "alphabetical" bombs, etc.

They have discovered new processes that can be useful to us. Not only do we have a challenge to develop new theories but also we need to better equip ourselves to use existing theories. Machines have been invented which can aid our present theories in probing much deeper into the unknown. The electronic computer, for example, can do wonders with figures—but someone must feed it. Further development along these lines would be highly desirable.

There would seem, then, to be a great opportunity to refine and to further search for new and better ways of doing research. The magnitude of this field is difficult to grasp, especially for one who realizes this to be one of his outstanding weaknesses.

It's time to leave this and move to other horizons.

Develop the Work in Public Affairs

Public affairs or public policy is a term used more frequently among agricultural economists. Work in this area has been more or less in developmental stages. Here is another challenging horizon. It is here that we have not been able to give ready, unqualified, yes and no answers. We need to develop more refined methods of approaching problems in this area also.

When speaking of public affairs or farm policy, our thoughts usually go immediately to a farm price program or foreign trade. True, these are part of public affairs, but often they are vague problems to farmers and economists. We can probably do a better job of defining the field. "Meeting the needs of the farmer outside the line fence" has been said to explain the area. It includes local questions, such as school levies as well as national and international problems. If we can bring ourselves to thinking in terms of more specific public affairs problems, we may be able to overcome some of this vagueness.

Here is another aspect of the public affairs question. Each of us as individuals has certain objectives or values. Most of the time these objectives are not consistent either with others held by us or with those held by others. For example, I hold as very important the objective of

individual freedom of action. I also hold as an objective of agricultural policy that of stabilizing incomes of farmers.

It is agreed by many economists that one way to attain the latter objective is through control of price and production. But control of these might well interfere with my first value, that of individual freedom. So I begin looking for another method of achieving stability which will not be so adverse to my other values. Maybe I will compromise and say that stability should be achieved through monetary and fiscal policies or some other modification of complete price regulation, trying to harmonize my objectives.

The point is, I do this as an individual not as an agricultural economist. This does not relieve me of the responsibility as an economist. If anything it gives me added responsibilities. I have no right as an economist to try to force my social values upon other people. The challenge for me is one of clearly pointing out the effects of various programs upon different objectives. Then through our political process the best solution can be obtained.

It is my conviction that the principal reason for confusion in agricultural policy is our lack of research in the field. Too often we have been compromising biases with but few facts. Perhaps our differences in objectives would not be so great if we knew more facts with which to weigh judgments. We are only beginning to obtain basic research data to handle many problems in the policy area, including finding out more about objectives themselves.

For example, we know too little about the entire area of information vs. more direct controls. We used to say that if we teach people the scientific method—to be able to weigh facts, that they will make correct decisions. The Bureau of Agricultural Economics was founded on this premise. During the period of the thirties the philosophy changed somewhat. More direct measures were taken. Agriculture prospered during the war. The aftermath of unbalance to the agricultural economy which followed both World War II and the Korean conflict has caused much confusion about what is good for the farmer and what is good for society. We have still to come up with a satisfactory answer as to the long and short run effects of the two types of solutions.

A third aspect of future developments in public affairs lies in the influence of the economist in the political arena. Those directly interested in the problems of agriculture (farmers themselves) are becoming fewer in number. We are all familiar with the Census figures showing that nationally around 15 percent of our total population is composed of farmers. As this percentage becomes smaller in the future, the political influence of this group of people may well become less.

We are looking forward to the time when the economist can make himself heard more plainly in matters pertaining to policy. With this horizon comes the added responsibility of checking and rechecking to make sure he is right.

When our population was predominately rural, special farm interests exerted considerable influence in determining farm policy. As this situation changes, agricultural policy objectives must more nearly conform with those of society in general. Legislation is, and doubtless will continue to be, influenced greatly by pressure groups. Rural interests may need someone to point the way toward more universally congenial solutions. Although he may not be forced to do so the agricultural economist should have an important role in this development.

Again we should mention that this whole area of public affairs and coping with political issues is truly a challenging horizon.

Other New Horizons

Another illustration of the closer working relationship needed between agricultural economists and other social scientists is in the area that deals with the *part-time farmer.*

This type of producer is becoming more important in numbers. We know little of the value of his contribution to the economy. We also know too little about him as an individual producer.

According to the 1950 Census over 31 percent of all farmers were part-time and residential farmers in the United States. A few years ago the figure was 16 percent. This situation calls to mind horizons in land use problems, in tenure problems, in rural zoning, inheritance problems and others. There is little information concerning land use as it relates to particular world supply-demand situations. We have never had to face many of these in the past but we likely will need to in the future.

Production problems and living standards of part-time farmers are not entirely the concern of sociologists. Economists also need to develop this area. In the past farm programs have given them little consideration. Price support programs have been only incidentally their concern.

Closely allied with this horizon is that of *underemployment in agriculture*—working with those who have not remained efficient enough to maintain satisfactory livelihood there. Our opportunities do not end with efficiency. Perhaps too often we have spoken of the farm problem rather than the farmer's problem.

This should not be attempted alone. It will require interdisciplinary cooperation of the sociologist, the general economist, the psychologist, and others working in closer cooperation. We may need to stress the macro-economic approach more in this area.

Lets turn now to some horizons in the field of *marketing*. Not very many years ago agricultural economists were primarily concerned with farm production—in how to combine land, labor, capital and management to arrive at most efficient use of resources. It was called farm management.

Before long the need was felt for increased emphasis in marketing. Almost everywhere we now have strong marketing sections in our departments of agricultural economics. It is now becoming a tremendous division in agricultural economics—both in size and importance.

The area includes work with distributors, handlers, and farmers. More people are engaged in this area than are engaged in producing farm commodities. We have around 15 million people selling the farmers' products or selling products to him. About 10 million people are engaged in farming.

Horizons in this area, then, are almost unlimited. The next few years will see a tremendous increase in consumer information; in helping consumers locate best buys, giving nutrition aids, smoothing our supply movements, etc. The thread between urban and rural outlook will become thinner and thinner. This interest in consumers is important to farmers. We must not become propogandists for any one group but an agency serving the general public.

A few institutions are conducting educational programs with "middlemen." This emphasis on education to food handlers is merely another attempt to obtain more efficiency in the food marketing system.

All these new developments are going to require even more research in marketing. There are few really practical laboratories for experimenting with the best possible ways of marketing, except through cooperation with our present marketing agencies. In many instances we will need closer working relationships between related industries and educational institutions. In other circumstances we might well explore the possibilities for securing practical laboratories to be used for educational purposes.

It would be unfortunate if we did not bring into a discussion of this sort, what the future holds for old faithful—the *farm management* educator—The one who for all these years has been talking of farm efficiency and who still holds an important place in our future.

It is quite probable that every one of us has heard of the new program in Extension called farm and home development, balanced farming, farm and home planning or some similar title. The titles all add up to one objective—showing and demonstrating to farmers how more profits and better living can be obtained through sound farm management practices. It means working more closely with individual farmers and homemakers.

This program may demonstrate that economists are recognizing goals other than maximization of income. Other satisfactions may need to be

considered and should be considered by economists. Farm and *home* planning recognizes these facts.

Our responsibilities in farm management have grown to the place where we must rely on closer cooperation with other physical scientists. Rather than going our separate ways, we need to be coordinators of information from the engineers, agronomists, animal husbandry folk and others. When we want to know facts we must learn to work more closely with them in obtaining these facts.

Like the consumer information program this program in farm and home planning may rise or fall on results obtained by this more intensive approach to the problem. We in agricultural economics have considerable at stake. Many think this is only the beginning of a larger expansion in this field; that much more growth can be expected in the future. Our challenge is to make the most of our opportunity.

Possible Future Developments

Let us turn from the horizons we have chosen to classify as "challenges" to be encouraged by economists themselves to some possible future developments which now seem to be inevitable regardless of whether or not we as economists do anything about them.

The one "hope" for the farmer in the future I have heard expressed most often is this: "The rate our population is growing we will soon be talking of shortages in agricultural products, rather than surpluses." We realize that over 7200 more people in the U. S. will be eating breakfast tomorrow morning than ate breakfast this morning. Add this daily increase for a year and we come out with something over 2.5 million extra people. There is no indication this growth will slow down appreciably.

It is here that I would like to submit this prediction: In the forseeable future, increased population pressures will *not* appreciably lessen our *surplus problems* in Agriculture. In any particular year, weather will be a larger factor than population pressures. We have experienced several years of quite favorable weather conditions. A general drouth such as experienced in the mid-thirties has not occurred since then.

The basis for this belief concerning population growth and food supply lies in part in what has happened historically in this country concerning technological advancements. Since before World War II, agricultural production has increased something like 45 percent. In that same period our population has increased around 26 percent. These developments do not lead me to think population increases will "bail us out."

It seems to me a key to whether or not we will be running into food shortages lies in the differences between present "know how" as determined by research compared with present production by the average com-

mercial farmer. Until the lines between what we know how to do and what we are doing become closer together we should not worry too much about population pressures. It is our challenge to find more effective means of getting these results from research put into action on individual farms.

Competition from chemistry is going to become an increasing problem to farming businesses. New developments are appearing almost every day, which will make necessary a continual shifting of resources in farming. The one we have heard a great deal about in Ohio is the shift from butter to margarine. There are still sincere farmers who believe oleo should be outlawed. Synthetic fibers is another example. We could mention others. I believe we are observing only the beginning of a revolution in chemical progress.

This all adds up to a firm belief that agriculture in the future will continually be faced with adjustments. It is our job to point out possible ways and provide help in making these adjustments less painful. At the same time we need to continue our efforts to find better, more efficient ways of producing and marketing farm products.

The *delicate balance between supply and demand* for farm products is becoming ever more delicate. As agriculture becomes more specialized and commercialized its welfare will become more dependent upon outside influences. Check the changes in farm population over the past one hundred years. It has gone from 80 to 60 to 40 to 20 to 15 percent of the total population. The number of commercial farmers is probably no larger than eight percent of the total population. If population increases as expected and should the number of commercial farmers remain where it is now, by 1980 the percentage of commercial farmers of total population may be as small as five percent.

What does this mean? Small changes in demand or supply per person are and will be even much more significant than when 80 percent of the people were farming. *Price fluctuations* although now a problem, may well become an even greater problem in the future.

The final development I will mention is in the field of *international agricultural economics.* I began to say "foreign trade" but it is much broader. Let us assume a situation where we can see every phase of our advances in economics which we have experienced nationally applied on an international scale. Increasing productive capacity and efficiency in underdeveloped countries is a tremendous challenge.

We will live even closer together—in time. The question is raised as to whether or not we will become more internationalistic in our economic thinking or again draw toward nationalism. We have not begun to find solutions to the economic problems involved when people are beginning

at the subsistence level to raise themselves by their so-called "boot straps." Fortune prevented us from ever needing to face this situation in this country. Most of these situations in foreign countries are with farm people—if adequate solutions are to be found, we will need to play a big part in finding them.

Part of this whole development is tied closely to world commerce. Foreign trade might well be the key to our future price problems. Follow the build-up and decline in foreign trade over the past 50 years. Check these against price rises and declines. Sudden changes in demand, although small can cause large changes in price because of the inelasticity of demand for many products. The 1954 edition of the effect of foreign trade upon our markets can be found in the cases of wheat and soybeans.

Again the whole area of international economics will become a more and more challenging horizon as distances grow shorter.

These have been only a few examples of possible new developments and opportunities in the field of agricultural economics as seen from the eyes of a graduate student. There are no doubt hundreds of others.

In summary we should keep in mind: (1) added responsibilities and opportunities given us in certain areas because of legislative actions; (2) the necessity of working more closely with other social scientists in solving problems of farmers; (3) the possibility of coordinating our work more closely with that of other physical scientists; (4) recognizing and anticipating technological advances in agriculture and related fields and (5) our tremendous opportunities in the field of international agricultural economics.

DISCUSSION

GEORGE L. CAPEL
University of Florida

Mr. Dougan has given some definitions of horizons. I would like to add that although horizons may appear to be distinct, what lies beyond them is undefined or hazy. I would also like to point out that horizons extend in all directions. It is not possible to completely box the agricultural economics compass in a brief paper. However, it is possible to indicate what seems to be its cardinal points.

A discussion of new horizons or future developments in the field probably could be considered successful if it presents a logical analysis of situations that may arise and why they may be expected. If we reviewed the literature of the field we might discover that in the past many developments were predicted which have never materialized. When proposed they may have been accepted as likely directions of interest. If these seers of the past are not to be criticized for their prophecies, then the present horizon viewer may venture out on economic limbs and not fear too much for his professional hide. Furthermore, there are advantages obtained by climbing out on limbs, such as the fresher air and better view.

What are some of the horizons that we face in agricultural economics? To mention a few, there are horizons in resource use and development, in methodology and in public policy.

Horizons in Resource Use

Dougan referred to one resource use problem that faces us when he discussed underemployment in agriculture. This problem is certainly a challenge but our resource use dilemma does not end here. Water, once ubiquitous, has already become a scarce resource in some parts of the country, and may become more so in the foreseeable future. When a resource becomes scarce, it acquires an economic value and its use must be allocated. Can the interplay of free market values allocate the use of scarce water? We must be prepared to answer this question within the next 25 years. Water policy, allocation among users, conservation, watershed development, prevention of flood damages and power are only a few of the sub-areas in which research is greatly needed. Adequate solutions to the water-use problem will require the most careful research in both the physical and social sciences.

If our economic theories are even approximately correct, it is the optimum combination of all scarce resources, not merely the efficient use of any one that will maximize the ability of people to satisfy wants. The current interest in farm and home planning is aimed at obtaining the optimum use of resources. The program will be directed at showing individual farmers the alternative plans of their farms and the expected returns from each. The emphasis must be based on the farm and all its resources, including the farm family. We, as economists, allocate returns to land, labor and capital. The farmer sees one monetary return but other values also, such as pride of ownership and greater opportunities for recreation. The farm planner who ignores these other values and tries to maximize monetary returns only may be ineffectual.

Horizons in Methodology

There are those who believe that we stand on the threshold of a revolution in methodology. As an example of this, I call to your attention a new book, *Economic Activity Analysis,* edited by Oskar Morgenstern. The final chapter of this book deals with experimentation and computation. We have had some application of mathematics to the field of economics over a period of many years. Much of this work had only theoretical implications, because only recently have we found ways to handle the tremendous volume of computation involved. For example, under the Walrasian system, equations were developed and inspected to see if they were solvable. If so, the system was said to be useful although the computations were too voluminous to be made. We now have computer systems which can look a 300 by 300 matrix in its grisly face and never even bat an electronic eyelash. This may mean that as more of these computers become available for use in working on economic problems we will begin to be able to estimate perhaps for the first time, the parameters of a truly satisfactory model of the real world. Where before we had theories and models which were logically deduced from our assumptions, we may have models with explain– and predict–real world economic activity. Admittedly, this is in the realm of possibility but it can happen.

What are the implications of this potential development to agricultural economists? First of all, we would have sound empirical bases for policy evaluation.

We could state with greater certainty, for example, the effect of a marketing restriction program upon total revenue from a commodity.

There are other implications for economists. The emphasis in the mathematical approach until now has been on macro-economic problems such as the search for demand curves. This is understandable since the urgency in policy is here. But the use of this approach may also be expected to turn toward micro-economics—to the problems of firms and households. Many firms are already solving problems of production with economic activity analysis. As the electronic computers become more generally available to larger firms and to colleges, the use of those techniques will spread and become more refined. The early contribution will have to be for the larger firms—perhaps in the marketing field. But small firms should be reached eventually.

One of the important new developments which the computers may bring about, as pointed out by Morgenstern, is that economists will be able to do a considerable amount of "looking around" at the large volume of data already available. This involves computing a second layer of data and trying to find relationships there which may serve predictive uses. Morgenstern likens this possible development to the manner in which the biologists developed the use of the microscope. First, they "just looked." As they gained experience and developed theories they looked for *something*. He points out that with the new computers we could easily compute thousands of correlation coefficients, for example, and then look for relationships between them. At present, this is out of the question. When we tackle a problem now, we need to have a theoretical basis and hypotheses to be tested. Research funds are scarce. It is fool-hardy to spend a year on something which we know will probably be thrown away. But a few hours on an electronic computer would be a different matter.

All this may turn out to be merely what Dougan aptly called a cloud of dust. After the developments of the last 10 or 15 years, however, the possibilities mentioned here seem fairly tame.

Horizons in Policy

What is the role of the agricultural economist in policy formulation? Is he a detached observer and explainer? Is he a pleader for the special interests of farmers? Is he a guardian of the public interest? Mr. Dougan has stirred up some dust on this issue.

I would like to emphasize his statement to the effect that we should not attempt to merchandise our value judgments. There is, I believe, general agreement on the role of economic science in policy formulation. But practicing agricultural economists can and do differ on their mission. We will probably continue to have disagreement on whether we should be explainers, special pleaders or guardians of the public interest.

If you will permit me to put a personal value judgment on display, I prefer that agricultural economists stick closely to their economics in pronouncements on policy. We must keep in mind, however, that policy is based on more considerations than economics alone. Legislative bodies also take note of political and sociological considerations in formulating policy. Therefore, to be most effective, agricultural economists need to work closely with people in political science and in other fields. This may be a new horizon in agricultural Economics.

DISCUSSION

C. P. SCHUMAIER
University of Illinois

Mr. Dougan has suggested a number of horizons divided into two types; those which depend upon the efforts of agricultural economists themselves, and those which are inevitable. Generally I agree with his selection in the first category but find most of the selections in the second category more difficult to follow. I should like to add one or two points I see on the horizon and comment on the importance of some of those suggested by Dougan.

Economists like everyone else must economize, working in areas which promise to yield the highest dividends per unit of effort expended. Up to the present, agricultural economists have largely concentrated their efforts on the farm and the first off-farm marketing point. One of the most productive new horizons for on-farm application of agricultural economics I see is the application of industrial techniques to farming. Particularly putting what is known in factory terms as "automation" or automatic operation to work on as many farm chores and operations as possible. This will involve cooperation with engineering but economists will be called upon to pass on the economic feasibility of possible engineering installations. Automation of farm operations should make possible the application of superior management over much larger agricultural enterprises than has been possible in the past.

Beyond the farm perhaps the most important new horizon for agricultural economists is the work Dougan cites, working with the distributors and handlers of farm products beyond the first off-farm markets. Since half or more of the food dollar goes to these people and agencies, horizons in this area should provide a fertile field for agricultural economists both in introducing efficiencies into the system and in maintaining the percent of consumer income spent on farm products.

Agricultural economists indeed have a wide new horizon in building a more effective program of farm policy help to farmers, but I'm not sure what direction Dougan would see our work taking. He starts out implying we should give yes and no answers to policy questions and ends saying we should point out the effects of alternative policies and leave selection of objectives entirely to the political arena. Much of the problem of guiding policy in a democracy arises out of conflicting individual and social goals. Unfortunately for social scientists no one has yet found a serum to inject into voters and legislators which will transform their thinking from narrow short-term individual and pressure group goals to wider long-term social goals. The horizon is as Dougan suggests developing avenues to get our suggestions heard and adopted. I cannot go along with him however when he assigns us only the role of impartial explainers of the effects of alternative policies. I think economists must explain effects as impartially as possible and then state their convictions on the evidence as they see it.

For work with part-time and underemployed farmers I see a slightly different horizon for agricultural economists than that suggested in the paper. It seems to me the most profitable concern of agricultural economists in this area is the transformation of those farmers who can and want to be into full time fully employed commercial farmers in order that the food supply situation will maintain its present favorable trend. In connection with these problems I'm not very hopeful about interdisciplinary cooperation in the way suggested by Dougan. We need to make use of the knowledge of other disciplines in our work but I think we will have to go after what we need in their literature. For example, psychologists are concerned almost entirely with the personal problems of

individuals; economists on the other hand are concerned primarily with the impersonal economic relationships of groups of individuals, of areas, and of groups of commodities, concepts entirely foreign to the psychologist. After suggesting interdisciplinary cooperation Dougan comes back to a macro-economic approach which would practically rule out the other disciplines.

I was glad to see consideration of goals other than economic mentioned as a horizon for agricultural economists. We may well be coming to a stage in our economy when the stress should not be on production of so many automobiles, cameras, golf clubs, and TV sets that we have no time left to use them, but rather on a new balance between material production of gadgets and leisure time to enjoy them. Agricultural economists can well give some thought to this problem.

Turning to the inevitable developments, I have no quarrel with the optimistic food-population balance foreseen in the paper. Agricultural economists have been in the middle of this development as long as agricultural economics has been recognized. As stated above the application of industrial techniques to agriculture should make it possible to spread good management wider than has been possible in the past. With fewer and higher quality managers the problem of getting new techniques adopted should become simpler. The conversion of less than commercial farmers and farming areas to commercial farming must continue in order to keep us well fed. Agricultural economists have also been active in this area a long time.

On the second point only the competition of chemistry was mentioned and nothing was said of help from chemistry. Up to World War I we increased food production by cultivating new land, from World War I to about 1950 we increased food production by mechanizing, and now it appears chemistry will be used to increase food production still more. Antibiotics, fertilizers, and weed and insect killers are examples of chemistry applied to agriculture. The horizon for agricultural economists lies in keeping abreast of new developments in order to help farmers make the best application of them.

On the third point, I find myself in complete disagreement. If the commercial farm population declines to five percent or less of total population, society is likely to have less, not more interest in agriculture; an interest akin to that we now have in the dry cleaning industry or retail trade. The horizon here is tied in with public policy discussed earlier in the paper. Agricultural economists can help farmers see their industry in proper perspective in the economy as a whole. Farmers often comment on the primary importance of food to the nation without stopping to think of the equally primary importance of gasoline and machinery in the production of that food. Our duty in this field includes both helping farmers secure fair treatment from the rest of the economy and helping them avoid costly political mistakes based on bad reasoning. Dougan suggests this approach in his discussion of public policy but does not follow through in his discussion of the adjustments facing agriculture.

On the last point, international agricultural economics, I should like to add that both economists and agricultural economists have a big job convincing the citizens of this country, farmers as well as businessmen and laborers, that imports are not enemies of our economic system. Equally important in this two power world is the right kind of technical and economic assistance to countries whose political loyalties are still at stake. These countries are predominantly agricultural and it may well be that the power group which can do most for their agriculture will ultimately control their political loyalty. Agricultural economists should be in a unique position to help implement such a program both here and in underdeveloped countries.

ECONOMIC EFFICIENCY IN CALIFORNIA PEAR-PACKING PLANTS*

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A CASUAL survey of plants engaged in the production of almost any type of marketing service is likely to reveal a wide variation in both size of plant and methods of operation. Clearly, some of these methods and some sizes may, under given circumstances, permit lower costs of production than others. However, individual plant managers normally cannot be aware of the cost relations for each alternative technology or size of plant. In fact, they often will not know of the existence of some of the newly available technologies.

On the other hand, information of this type can be obtained by a central agency with access to many plants and with specialized personnel qualified to measure and analyze these cost relations. The data may then be made available to all plant operators and should provide useful guides for planning for new facilities and for possible reorganization and consolidation of existing facilities.

In 1949, with this general type of objective, the California Agricultural Experiment Station and the former U. S. Bureau of Agricultural Economics initiated a long-run cooperative study of costs and efficiency in the marketing of deciduous fruits. The thesis summarized here is an outgrowth of the work carried out (and still continued) under that project.

The first part of the dissertation is concerned with the development of a theoretical framework for empirical studies of cost and efficiency in the production of marketing services, and with the general approach that has been used in this study to measure cost relationships. The second part of the dissertation draws on material developed under one phase of the over-all research program to fill out the theoretical framework with empirical estimates of costs for a particular group of plants—California pear-packing houses.

Theoretical Framework

The major pillars of the theoretical framework are provided by elaborations and modifications of the conventional economic theory of production. These elaborations stress four important points.

First, total plant output for any demand or sale period is commonly varied by holding rates of output constant and changing the number of hours operated, as well as by varying rates of output. Rates of production do not always correspond to rates of consumption. Variation in output

* Summary of award-winning Ph.D. thesis filed at the University of California.

through changing hours of plant operation results in linear input-output functions. Failure to clearly distinguish between rate and time variation has been a source of a good deal of the controversy that has existed concerning the nature of plant cost curves.

Second, plants are usually composed of an integration and aggregation of many stages or operations with a resulting compounding of the usual theory.

Third, most cost functions are discontinuous, rather than continuous as assumed by conventional theory. This condition arises partly in combining the operations for the various stages and in part due to the discrete nature of most inputs. For any given plant, machines are commonly available only in selected sizes and men must usually be hired in whole units. Discontinuities in the cost functions lead to contradictions of the profit maximizing conditions (marginal cost equals marginal revenue) of the conventional theory. And where output is varied by successively employing identical machines, the cost curves though discontinuous, may be linear in over-all effect. Increasing or decreasing returns would be expected only where there is intensification on some limiting factor.

Fourth, many inputs consist of durable goods that are only partially consumed in any short period. This leads to difficulties in determining the nature and costs of inputs of durable factors. These difficulties are inadequately handled in the usual theory of production.

Research Methodology

The considerations involved in the theoretical framework suggest that effecitve cost measurement should begin at the level of the individual plant stage, or with even more elemental operations. The measurements may then yield input-output functions that provide a fundamental basis for comparing the costs of alternative technologies and for developing total plant cost curves.

Engineering measurement has been stressed as a means of obtaining basic data, although data from plant records and from manufacturers of equipment were also used. In many cases the details required to conform to the theoretical framework can only be obtained through engineering studies. On the other hand, data on some other aspects of the plant operation are obtainable mainly from plant records or from manufacturers of equipment.

The general procedures used in collecting and analyzing the data were as follows. First, a sample of plants was selected with the objective of covering a wide range in size and methods of operation. No attempt was made to design the sample so as to be representative of average conditions throughout the industry.

Next, each of these plants was visited during the operating season. Descriptions were made regarding the nature of the process, work methods, and equipment used in individual jobs, crew organization, plant layout and flow of products and materials. Estimates of basic time requirements for performing many of the plant jobs were obtained through work measurement studies such as time and production studies or work sampling studies.

After the operating season each plant was revisited in order to obtain data from the plant records. The information obtained included daily output figures, hours of plant operation and labor input of various types for most of the season, as well as data on various non-labor variable costs and costs of durable items of equipment. At this time the plant was also inventoried with regard to all items of equipment and types and nature of building construction. The latter along with data from manufacturers, provided the material for estimates of current replacement costs, which in turn form the basis for estimates of future expected average annual costs.

The data collected from the plant records and through engineering measurement, and from manufacturers specifications were blended together to estimate the detailed cost relations for each alternative method of operation observed for each of the various components or stages of the plant process.

These cost estimates were based on standards for "reasonable efficient" operation. For a particular stage, the most economical technology for any rate of out-put and length of operating season was ascertained simply by comparing stage cost functions for the various alternative methods that could be used.

The next task was to find the combination of stage technologies at each rate of output that would give the least total plant cost; in other words, to develop a long-run cost curve which would represent the total or average cost for an efficient plant of any given size. In cases where the choice of method or technology at one stage was independent of the technology used at other stages, the total cost function was obtained by straightforward addition of the least cost or "efficient" long-run cost functions for each individual stage. In actual practice, however, the process of selection and aggregation was complicated by interrelations among several of the plant stages, requiring consideration of many alternative variations in plant organization.

Leading Results

As was emphasized earlier, the total cost function obtained through the aggregative process is discontinuous. It was found, however, that a smoothed continuous function did little violation to the final analysis,

while permitting the results to be presented in a much more simple and usable form. Every point on this function represents an efficient plant, although with the actual discontinuities, several points may represent the same plant.

Comparison of the planning function with existing plants reveals that, although California pear-packing plants are generally operated with a relatively high degree of efficiency, there are adjustments which might permit substantial reductions in cost over a period of time. These include the following: (1) reducing costs through selection of more efficient combinations of component or stage technologies; (2) consolidation and expansion in the size of some of the smaller plants to take advantage of economies associated with larger scale operation;[1] and (3) further consolidation by operating two shifts per day and so increasing total output per unit of fixed investment. Possible industry savings through these adjustments are estimated to be about $360,000 per year for the first step, $105,000 for the second step, and over $200,000 per year for the third step.

Evaluation

The theory that has been suggested as a framework for studies of cost and efficiency, if valid at all, is valid regardless of the procedures used to obtain the empirical estimates of cost relationships. However, the approach to the study of cost and efficiency that is used here is certainly not the only or necessarily the best approach to this problem. The methodology used must be evaluated in terms of the specific objectives of the research and the particular nature of the productive activity to be studied.

If one of the objectives of the cost study is to compare the costs of alternative methods of performing a specific operation or to devise improved methods of operation, the detailed engineering-accounting record approach used in this study may be the best and perhaps the only way to obtain the necessary cost data. The detailed cost estimates may then be integrated or synthesized into estimates of total costs which can be used to achieve broader objectives, such as determining the economies of scale and possible advantages of industry reorganization.

A disadvantage of this approach is that it is costly in terms of man-hours of research labor. If the objectives of a study of cost are fairly broad—e.g., to compare total costs or to determine only the general economies of scale—a less costly approach might be used which would give somewhat less refined results, but which nevertheless might give adequate approximations in terms of a much lower research cost. To illustrate, a combination of total cost data from plant records and rather broad engineering

[1] A full evaluation of such economies must, of course, consider costs of assembling the raw fruit, as well as the in-plant costs.

observation might yield approximations to the economies of scale curve which, while not as refined and accurate as obtained by more detailed studies, would give satisfactory approximations for a considerably smaller research cost.

An important factor tending to offset the cost disadvantage of the detailed studies is the accumulation over a period of time of estimates of standard labor requirements for performing many different operations, and, to a lesser extent, standard requirements for certain types of buildings and for some nonlabor variable costs. As different types of plants are studied, it will be found that some of the operations are quite similar to those in plants studied previously. The standards already developed may then be used to estimate costs for these operations, thus eliminating the need for some additional measurements. Moreover, the measurement procedures developed are being continually improved so that a given amount of data may be obtained with considerably greater research efficiency.

A STUDY OF THE NATURE AND COST OF GOVERNMENT PROGRAMS AFFECTING POTATOES AND THEIR IMPACT ON INTER-MARKET RELATIONSHIPS*

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A COMPLETE evaluation of the effects of government price support programs probably will never be possible. There are many areas, however, where evaluation can be conclusive enough to provide the basis for sound policy recommendations. My thesis represents an attempt to evaluate some of the less elusive aspects of the program which applied to potatoes during the war and post war period. It consists of three separate though closely related phases: first, a considerable amount of background material is presented in the form of a chronology of government programs, which applied to potatoes from 1934 through 1950. Second, analyses are made with a view toward estimating the money cost of supporting potato prices from 1942 through 1950, and assessing the long-run impact of the program on resource use efficiency. Third, an attempt is made to evaluate the degree to which potato producers can use marketing restrictions to increase returns from their crop.

Earlier programs which applied to potatoes included marketing agreements and orders, section 32 purchase and diversion operations, and soil conservation payments. The first commitment to support potato prices was made in 1942. The support level was set at 75 percent of parity. Beginning with the 1943 crop, potatoes became a "Steagall" commodity. They were supported at 92 percent of parity during that year, at 90 percent of parity from 1944 through 1948 and at 60 percent of parity in 1949 and 1950.

This program was interjected into an industry characterized for many years by 3 major phenomenon: (1) lack of locational stability, (2) declining per capita consumption not fully offset even by fairly rapid population growth, and (3) price uncertainty. High level price supports immediately altered two of these conditions. The demand picture was changed since farmers were assured an unlimited market for all they could produce at the support level. This meant that price uncertainty was virtually eliminated. These changes, coupled with relatively high wartime income levels,

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* Summary of award winning Ph.D. thesis filed at the University of Minnesota. The thesis was developed as part of a larger regional research project which has been published as Minn. Agr. Expt. Sta. Bul. 211, *An Economic Analysis of the Impact of Government Programs on the Potato Industry of the United States*, by Roger W. Gray, Vernon L. Sorenson, and Willard W. Cochrane. A popular summary has been published as Minn. Agr. Expt. Sta. Bul. 424, *Price Supports and the Potato Industry*, by the same authors.

brought about rapid adjustments in the pattern of potato production. These adjustments had important implications with respect to the cost of the program to consumers and taxpayers and in terms of their effect on production efficiency.

Potato production increased beyond the amount that the commercial market would absorb at a price which would cover marketing charges and provide a return to producers equal to the support level. As a result government expenditures totaling $552 million were required to remove surplus potatoes from the market. These payments plus an undetermined amount of administrative expenses represent the cost of the program to taxpayers.

Consumers, on the other hand, appear to have benefited from the program. Estimates were developed which indicate that with a free market, average price to the farmer would have been well above that which actually prevailed. This means that consumers bought their potatoes at a lower price than they would have under a free market and that the combined cost to consumers and taxpayers was less than the cost to taxpayers alone. The saving to consumers offset part of the cost to taxpayers.

The conclusion that price supports represented an effective price ceiling as well as a floor has important policy implications. It probably means that the program did not have its intended effect on producers incomes. Though it appears that with supports, enough extra potatoes were sold to provide a greater total return than would have been obtained from the free market, this does not mean that farmers were benefited. Costs were incurred in producing the large quantities sold as surplus. Hence, though the additional income from commercial sales may not have fully offset the value of government payments, the fact that it would have been obtained through higher prices and with the sale of fewer bushels implies that the net income received from potatoes might have been increased by a free market.

Since prices were below their free market level it seems evident that the most important factor which farmers responded to in adjusting production during the support period was the elimination of price uncertainty. Because of an inelastic demand situation and price responsiveness by producers, free market prices historically had been very unstable. The elimination of this instability permitted farmers to make production plans without discounting heavily to avoid losses in low price years.

The program appears to have been beneficial in terms of its effects on production efficiency. Calculation of an index of production and price trends related so that equal weight is given to each, shows that in the years 1941 through 1950 farmers would have produced 24 percent more potatoes than the average for the period 1910 through 1950 without any

improvement in the price of potatoes relative to other farm products. The pattern of this change was, of course, not consistent. Farmers in some areas would have reduced production while those in other areas would have increased production substantially. In balance, however, the changes were such that potatoes were produced at a lower real cost during the price support period than before.

The other important efficiency factor which must be considered is the fact that resources were devoted to the production of unwanted potatoes throughout the price support period. The longer range benefits from the accelerated shift to more efficient production, however, may overbalance the losses resulting from uneconomic resource allocation. In other words, it is possible that the housewife is paying a lower price for potatoes today than she would be if the program had not contributed to improved production efficiency.

The last section of the thesis deals with the application of marketing agreements and orders to potatoes. Potato producers can look to two sources of monopoly power in attempting to raise prices. These are product differentiation and control of market supply. Marketing orders can be aimed at the latter of these as a short-run approach to improved prices. The analysis developed in this section indicates that only Idaho-Colorado producers have a statistically measurable degree of product differentiation, and that no single homogeneous group produces a sufficient proportion of the crop to assure an increase in total returns from a policy of restrictionism. These results apply to the short-run period when the total supply is fixed. The major conclusion of this section, therefore, is that the potato marketing orders which were instituted during the latter phases of the program as a part of the price support activity were not effective in increasing returns to producers.

Concluding Remarks

The potato program ended with the 1950 crop. The three years 1951 through 1953 indicate that potato prices have again become very unstable. The 1952 crop was sold at very high prices reaching as much as an average of $3.10 per bushel during the peak month. Following this bonanza, prices dropped rapidly until we find that the simple average of mid-month prices from July 1953, through June 1954, is $.91 per bushel. A low point of $.53 per bushel was reached in March of this year. The magnitude and rapidity with which prices have fluctuated since 1950 indicates that farmers responses to price did not undergo any basic change as a result of the altered production pattern brought about during the 1940's. Now that potatoes are back in legislative good graces the question of whether farmers would again respond to price certainty in the way they did from 1943

through 1950 becomes pertinent. It is possible, and I might even say probable, that an assured price, unless set at a very low level, would again result in annual production of well over 400 million bushels. This would bring about a recurrence of the surplus problem with possibly much the same public reaction that resulted in the discontinuance of price supports in 1950. The problem which seems to present itself is this—How can the extreme price uncertainty which faces potato producers be mitigated without creating the surplus dilemma? The way is not completely clear. Yet the experience of the past should provide the basis for avoiding some of the more glaring errors that were made in the old program if potatoes should again become subject to price supports.

MINUTES OF THE MEETING OF THE EXECUTIVE COMMITTEE OF THE AMERICAN FARM ECONOMIC ASSOCIATION, PENNSYLVANIA STATE UNIVERSITY, SUNDAY, AUGUST 22, 1954, 9:00 P.M.

Present: Aull, James, Cowden, Trelogan, Ackerman, Witt, and Hardin.

1. The meeting was called to order by the President, T. K. Cowden.

2. The minutes of the preceding Executive Committee meeting were approved.

3. G. B. Wood moved and L. W. Witt seconded the election of Harold Halcrow as Editor of the *Journal*. Carried.

4. A vote of appreciation was extended to L. W. Witt for his three years of excellent work as Editor of the *Journal*. Thanks was also extended to Michigan State College for its support of the Editor's office.

5. The Secretary-Treasurer presented his report on the year's business which was accepted. This report is attached.

6. L. W. Witt presented a new proposed contract from the Banta Publishing Co. for printing of the *Journal of Farm Economics*. This proposed contract would increase the cost of publication by 10 to 12 percent, size of issues remaining constant. Witt reported obtaining bids from other potential publishers. He recommended signing with Banta whose bid was judged most suitable for the Association. This proposed contract is for an indefinite period but is subject to cancellation from either party within 60 days upon notice. Wood moved and Ackerman seconded the signing of the contract with the Banta Publishing Company. Carried.

7. An amended budget for the Association for the ensuing year was presented and accepted.

8. Brooks James reported for the Awards Committee with a recommendation that three awards of $250 each for outstanding Ph.D. theses in 1953 be awarded, and that three $250 awards for outstanding research reports published in 1953 be granted. (The names of the award winners are listed on the inside of the back cover.) It was moved and seconded that the recommendations by the Awards Committee be accepted. These awards were announced at the Tuesday night session and were made by Brooks James.

9. L. W. Witt reported the selection of the Editorial Committee on the best *Journal* article of 1953. It was moved, seconded and carried that the recommendation of the Editorial Committee be accepted and that this award be made by Witt at the Tuesday night session.

10. Harry Trelogan made the report of his committee appointed to appraise the awards program of AFEA. A copy of this report is found elsewhere in this volume. The report was accepted with thanks.

11. The question of the American Farm Economic Association becoming a member of the National Conference for FAO was referred to the new Executive Committee.

12. Offers of business organizations to support awards for research and research papers in specific areas (future prices, farm machinery, soil conservation, etc.) were discussed. Supporting of the awards program to offer prizes in specific limited areas was ruled inconsistent with the goals of the awards program, hence these offers will not be accepted.

13. Editor Witt presented his report which was accepted with thanks. It is published elsewhere in this volume.

14. A request for the Association to establish an employment agency to be operative at the next meeting of the Association was discussed at some length. This matter was placed in the hands of the new Executive Committee with the suggestion that the program committee for the 1955 meetings give this matter consideration.

15. A suggestion was made that an association committee be established to draw up standards for membership in the organization. It was decided that such specifications were not necessary and that such a committee need not be appointed.

16. The operation of the Student Section of AFEA was discussed at some length. The motion was made, seconded and carried that: (a) national dues from the student chapters be eliminated; (b) awards to the debators representing student chapters should be the same as last year. The Secretary-Treasurer was therefore instructed to award members of the winning debate team a five-year subscription to the *Journal of Farm Economics*, members of the runner-up team a three-year subscription to the *Journal of Farm Economics*, and all other participants a one-year subscription to the *Journal of Farm Economics*. He was further instructed to present suitable certificates to the participants in the debate at the awards meeting on Tuesday night. Subscription awards are to begin with the proceedings issue.

17. It was agreed that the special Finance Committee will be continued as is under the chairmanship of Frank Parsons. This committee will report at the annual meeting and its report will be carried in the proceedings.

18. It was agreed that alternatives concerning the number and nature of the meetings of the Association would be presented to the membership in its business meeting.

19. Recommendations of the committee to appraise the awards program of the Association were discussed. It was pointed out that certificates as well as monetary awards are now being presented. Essentially, the report given by Trelogan was accepted with the following amendments: (a) no restrictions are to be placed on the number of awards one individual may receive so long as he meets the age limit specifications; (b) books are to be deleted from the present competition with the understanding that a special awards program may be created for books; (c) no action was taken on the recommendation concerning establishment of a larger special awards fund.

20. The report of the Investment Committee of the Association was reviewed.

21. The meeting was adjourned.

L. S. HARDIN, *Secretary-Treasurer*

MINUTES OF THE ANNUAL BUSINESS MEETING, WEDNESDAY, AUGUST 25, 1954

President Tom Cowden called the meeting to order at 8:30 a.m. and presented his report, which is appended.

The Secretary-Treasurer made his report which is appended. Report was approved.

The report of the investment committee was given and accepted.

The report of the auditors was submitted and approved. It is appended.

Editor Larry Witt made his report, which is appended.

F. L. Parsons presented the report of the Special Finance Committee which is appended.

So that the membership might express itself concerning the number and character of our annual meetings, the group voted on the following three alternatives: (1) to meet one year in three with other allied associations thus retaining summer meetings of the present character two years out of three; (2) continue summer meetings as at present but strengthen joint meetings with allied associations in the winter; (3) continue with summer meetings and small participation in winter meetings as at present.

The vote of the membership on the above alternatives was: for number (1), 66; for number (2), 106; for number (3), 33.

Sam Thompson moved that the Association take as a guide alternative number 2 and work toward maximum membership participation in two meetings per year. Motion was seconded by Sherman Johnson and carried.

Joe Ackerman reported that joint sessions are planned with allied associations in the Detroit meeting on December 28, 1954. Bob Kramer of Michigan State College is handling local arrangements.

Ackerman also announced the Helsinki, Finland meeting of the International Conference of Agricultural Economists on August 19 to 28, 1955. Professor H. C. M. Case is assuming secretary-treasurership of the International Conference on a one-half time basis.

C. L. Stewart suggested that prior to the meetings of the Association next summer abstracts of the papers should be prepared, duplicated and made available to the membership.

It was suggested that the welcoming address delivered by Lyman E. Jackson, Dean, Pennsylvania State University, be published in the *Journal*.

On question from O. V. Wells, the chair explained that the annual meeting of the Association will be its summer meeting. It is not intended that the winter meetings of the Association become the business meeting of the organization.

Moyle Williams reported for the Election tellers. This report is attached.

G. Burton Wood presented the following resolution to President Milton S. Eisenhower of the Pennsylvania State University:

> The American Farm Economic Association has asked me, as President, to express to you and your staff its appreciation and thanks for everything that was done to make our 1954 annual meeting a pleasant and stimulating experience.
>
> The Pennsylvania State University has been an excellent host. We wish that it were possible to thank individually each staff member, each graduate and undergraduate student and each wife who contributed so much during our stay on your campus. We are grateful for their many hours of work and attention to "little things" which added so much to our convenience and pleasure.

We would appreciate your conveying our special appreciation and recognition for their contributions to Dr. Clare A. Becker, representing the group as general chairman, and to Mr. John Fishburn, Conference Coordinator of the University, who helped so much behind the scenes in connection with the meeting.

The more than 550 members of this Association attending from all parts of the United States, Canada and other countries of the world will long remember your beautiful campus, your excellent facilities and your unexcelled hospitality.

to Dr. Earl L. Butz, Assistant Secretary of Agriculture, Washington, D.C.:

The American Farm Economic Association wishes to express to you its sincere appreciation for your fine stewardship and service as Secretary-Treasurer of this Association. During the more than 18 months that you served in this capacity you contributed much to the progress and stability of our professional organization. Membership grew from around 1500 to more than 1700 members as a result of your efforts.

The responsibilities of your office have involved many details. Much time has been required from you and your secretarial staff at Purdue University. We are grateful to Purdue University for providing the necessary staff assistance to make the office of Secretary-Treasurer an effective one in our behalf. Please extend our thanks to the secretarial staff in the Department of Agricultural Economics at Purdue University for their fine help.

We will miss your personal counsel as an officer of the Association. It seems to some of us that a change in Administration in Washington may be necessary to make our office of Secretary-Treasurer less of an occupational hazard in the future. We wish you every success.

to Dr. Lawrence W. Witt, Michigan State College, East Lansing, Michigan:

The American Farm Economic Association has asked me, as President, to express to you its thanks and appreciation for your fine service as Editor of the *Journal of Farm Economics* for the past three years.

Under your leadership the *Journal* has grown both in size and in stature. It has been a tremendous task. It has taken many hours of patience and devotion in our behalf which has been beyond the call of duty. For all of this we are most grateful.

We are indebted also to Dr. Raleigh Barlowe and many of your colleagues on the Michigan State College staff and also to Harold Halcrow of the University of Connecticut for their editorial assistance in connection with the publication of the *Journal*. Please extend to them our thanks.

You have successfully encouraged younger staff members to become regular contributors. You have raised the level of professional competence of contributions. You have set a standard of performance in the *Journal* which will provide a challenge to future editors.

Retiring President Tom Cowden introduced incoming President Joe Ackerman and other newly elected officers.

The meeting was adjourned.

L. S. HARDIN, *Secretary-Treasurer*

REPORT OF THE PRESIDENT

It has been a pleasure as well as an honor to serve as your President during the past year. The progress of the Association has been due to the good work of many individuals serving in various capacities. Special mention should be made concerning the good work of the Secretary-Treasurer, Earl L. Butz, and later Lowell S. Hardin of Purdue University. Larry Witt and his editorial council have contributed much to the *Journal of Farm Economics*. From ob-

servation I can vouch for the fact that much of the contribution has come from the personal time of the Editor. Separate reports have been made by the Secretary-Treasurer and the Editor.

In line with the established policy of changing editors at three-year intervals, we have asked Harold Halcrow to serve as the next Editor of our *Journal*. We are indebted to Dr. Halcrow and the University of Connecticut for assuming this responsibility.

When Earl Butz accepted his new position in Washington, your Executive Committee was anxious that the Office of Secretary-Treasurer remain for at least one more year in the environment of Purdue, where an admirable job has been done in organizing the work of that office. We have therefore asked Lowell S. Hardin to be an unopposed candidate for that office. We anticipate a successful campaign. We are indebted to Purdue University for assuming this obligation.

Brooks James of North Carolina State College, along with his various committees, has done a good job on the awards program. You saw the results of their work last evening.

Perhaps the most unsought-for job in the organization has been performed in a capable manner by Frank Parsons of the Federal Reserve Board of Minneapolis. At the annual meeting last year the officers were instructed to make an attempt to raise funds for our special awards program. Frank Parsons and his committee have done and are now doing a good job on this rather unpleasant task. Frank will report later. It is my recommendation that this committee be continued until the current campaign is complete. We are deeply indebted to those who have contributed to this project, and I recommend that if you see fit an appropriate resolution be adopted by this meeting.

Joe Ackerman has served as chairman of a special committee to review our relationship with our student chapters. Joe Mutti of the University of Illinois has served as chairman of the student section. Ernest T. Baughman served on a special committee to review the method of handling our financial reserves. Harry Trelogan has served as chairman of a special committee to review our awards program. I am indebted to my colleagues at Michigan State for their help in developing the program. With your permission, I would like to include for the permanent record a complete list of all committees. This would prove helpful to future officers in looking for folks with experience in the various affairs of our Association.

Mr. Bushrod Allen served as chairman of a successful dinner meeting for agricultural economists held in Washington, D.C., in connection with the Christmas meetings. This dinner was attended by approximately 180 persons, 72 of whom were from outside Washington.

Last Sunday afternoon the Executive Committee had a seminar with past presidents of the Association. In this seminar we took a couple of hours to sit back and look at our Association, to draw upon past experience and to offer suggestions as to the future course we should travel. I am sure that your new President will incorporate some of the suggestions in this program.

In this year's program we have included three new features: (1) a special session for agricultural economists working with industry, (2) a "meet the author tea" for undergraduate and graduate students and (3) the presentation of two guest papers.

So much for the report. Now to mention a few unsolved dilemmas along

with some personal opinions. Through the year I have encountered a rather natural cross current. Some of our members insist that the annual programs and the *Journal* should pay much more attention to current day-to-day operating problems—we should be more practical. Others insist that the purpose of the Association is to increase the professional competence of the members. Like most problems in a democracy, some compromise will likely take place. It is my conviction that the primary function of the Association should be to promote the professional competence of its members.

There is a growing concern that our Association may be drifting away from the other professional associations, especially the American Economic Association. During this present meeting you will have an opportunity to express your preference concerning the possibility of returning to joint winter meetings with the other closely allied professional associations. I hope that serious consideration will be given to adopting some plan for holding joint meetings with other professional associations.

One final thing. It is my judgment that steps can and should be taken to encourage greater participation by graduate students in our annual meetings and in the affairs of the association. While I have been unable to come up with a specific program, I have done enough exploring to be convinced that a program can be developed to facilitate attendance at annual meetings by graduate students.

It has been a real pleasure and a distinct honor to serve as your President.

Judges for Awards Program

Program, H.B. James, Chairman

Theses, R. J. Doll
H. B. Rowe
O. C. Stine

Published Reports, W. W. McPherson
Max Brunk
Rainer Schickele
E. C. Voorhies
W. E. Hendrix
E. O. Heady
W. W. Cochrane

Student Section Committee

R. J. Mutti, Chairman
W. H. Alexander
L. L. Boger
C. V. Hess
J. G. McNeely
C. E. Trotter

Finance Committee to Raise Funds for Special Awards Program

F. L. Parsons, Chairman
E. T. Baughman
R. C. Kramer
C. D. McNeal
E. T. Savidge
G. B. Wood
L. A. Zehner
R. G. Bressler, Jr.
W. H. Nichols
Aubrey Brown

Special Committee to Appraise the A.F.E.A. Awards Program

H. C. Trelogan, Chairman
O. V. Wells
E. C. Young

Special Committee on Handling of Association Funds

E. T. Baughman, Chairman
Asher Hobson
Donald Henry

Committee to Review Student Relations

Joseph Ackerman, Chairman E. L. Butz R. J. Mutti

Investment Committee

E. T. Baughman, Chairman E. L. Butz E. C. Young

REPORT OF THE ELECTION TELLERS

The count of the ballots showed the following officers elected for 1954-55:

President-Elect ..... Karl Brandt
Vice-President ..... W. W. Cochrane
J. Carroll Bottum
Secretary-Treasurer ..... Lowell S. Hardin
Tellers: M. S. WILLIAMS
JOHN REDMAN
LARRY SIMERL
RILEY DOUGIN

REPORT OF THE SECRETARY-TREASURER

The American Farm Economic Association continued to grow during the past year, both in membership and in net worth. (Tables 1 and 4)

TABLE 1. NUMBER OF MEMBERS AND SUBSCRIBERS, JULY 1, 1950-54

	1950	1951	1952	1953	1954	1953 to 1954 NET CHANGE
Regular members	1279	1515	1534	1594	1740	+146
Junior members	160	149	107	208	187	− 21
U. S. Libraries and firms	313	307	321	304	307	+ 3
Foreign Libraries and firms	220	272	317	341	355	+ 14
Exchanges	12	12	0	1	1	0
Total	1984	2255	2279	2448	2590	+142

Membership is at an all-time high, showing a net gain of 142 over the year previous. Only in the category of Junior members was there a decline in membership. Most Junior members become regular members when they complete their graduate work.

The *Journal of Farm Economics* is now mailed to 43 nations outside the United States. Individual memberships include 103 Canadians and 142 foreign persons. In addition, a total of 355 foreign libraries and firms receive the *Journal of Farm Economics.*

Income and Expenses

Financially the Association had another successful year. Cash income exceeded cash expenses by $2077.39 (Table 2).

TABLE 2. CASH INCOME AND EXPENSES, 1953-54, WITH COMPARISONS

	Actual 1952-53	Actual 1953-54	Budgeted for 1953-54
Income			
Dues	$11,339.31	$12,320.71	$11,500.00
Back Numbers sold	930.99	1,046.25	900.00
Reprints sold	1,042.41	812.46	1,000.00
Advertising	315.00	300.00	500.00
Annual Meeting	73.06	145.56	00.00
Collected for WFEA	399.00	314.50	400.00
Collected for CAES	165.00	216.50	150.00
Collected for Student Section	28.60	20.40	50.00
Dividends and Interest	2,864.64	2,920.25	2,500.00
Other	61.68	44.51	100.00
Total	17,219.69	18,141.14	17,100.00
Expenses			
Journal Printing	11,043.73	12,147.22	12,000.00
Reprints	843.70	1,162.60	900.00
Back Numbers	62.00	50.00	200.00
Postage and Wires	341.72	151.70	400.00
Annual Meeting	710.49	895.27	600.00
Editorial Expense	774.90	402.50	800.00
Office Supplies	403.78	422.76	400.00
Paid to WFEA	403.50	325.50	400.00
Paid to CAES	161.09	51.91	150.00
Student Section	88.55	00.00	50.00
Adjustment for bad checks	00.00	38.50	00.00
Other	191.91	140.27	200.00
Interest earnings allocated to Special Grants Fund	307.82	275.52	275.00
Total	15,333.19	16,063.75	16,375.00
Net Gain	1,886.50	2,077.39	725.00

Special Grants Fund

Awards in the amount of $1600 plus $72.42 for certificates and postage were charged against the Special Grants Fund this year. Interest and dividend earnings of $275.52 (2½% of the beginning balance of $11.020.68) were assigned to the fund along with $675 new capital contributions received during the latter part of the fiscal year. As a result the capital in this fund decreased only $721.90 during 1953-54, leaving a balance as of July 1, 1954 of $10,298.78 (Table 3).

TABLE 3. TRANSACTIONS AND BALANCE IN SPECIAL GRANTS FUND, AFEA

	1952-53		1953-54	
Beginning balance, income				
Balance on hand, first of year	$12,312.86		$11,020.68	
Interest earned during year ...	307.82		275.52	
Capital contributions received .	00.00		675.00	
		$12,620.68		$11,971.20
Disbursements from fund				
Awards made during year	1,600.00		1,600.00	
Exp. of operating award program	00.00		72.42	
		1,600.00		1,672.42
Balance at end of year		$11,020.68		$10,298.78

Changes in Net Worth

The substantial net worth increase of $10,412.20 during the year is largely due to the $7,034.02 rise in the market value of the stocks and bonds owned by the Association (Table 4). No new stocks or bonds were purchased during the year.

TABLE 4. CHANGES IN NET WORTH, AFEA

	1952-53		*1953-54*	
Net worth, first of year		$61,803.89		$63,963.69
Change in cash balance	+ 594.32		+1,355.49	
Change in inventory value of stocks	+1,182.35		+7,034.02	
Change in inventory value of bonds	— 969.00		+1,321.19	
Net change in liability to Student Section	+ 59.95		— 20.40	
Net change in Special Grants Fund	+1,292.18		+ 721.90	
Net change from purchase and sale of securities	00.00		00.00	
		+ 2,159.80		+10,412.20
Net worth, end of year		$63,963.69		$74,375.89

Financial Statement

Total assets of the Association, July 1, 1954 were $84,712.62, liabilities $10,336.73 (in special funds controlled by the Association) for a net worth of $74,375.89 (Table 5). As $9,545.10 of this is in cash and $4,500.00 in U. S. Savings Bonds maturing in 1954, at least $10,000.00 in Association funds should shortly be invested or re-invested.

TABLE 5. FINANCIAL STATEMENT, AFEA, JULY 1, 1954

	July 1, 1953		*July 1, 1954*	
Assets				
Cash in bank	$ 8,189.61		$ 9,545.10	
Stocks at market value	38,322.50		45,356.52	
Bonds at market value	28,489.81		29,811.00	
		$75,001.92		$84,712.62
Liabilities				
Balance in Special Grants Fund	11,020.68		10,298.78	
Balance in Student Section, AFEA	17.55		37.95	
		11,038.23		10,336.73
Net Worth		$63,963.69		$74,375.89

The successful financial record of the Association during the past year, as during previous years, may be attributed to the unselfish generosity of the unpaid men who have given their time, and the unpaid institutions which have provided clerical help for the various officers. This is particularly true of the offices of the Editor and of the Secretary-Treasurer.

Respectfully submitted,

EARL L. BUTZ, *Secretary-Treasurer*

by LOWELL S. HARDIN, *Acting Secretary-Treasurer*

REPORT OF THE AUDITORS

At the request of the President of the American Farm Economic Association, we have examined the accounts of the Secretary-Treasurer, Earl L. Butz and the statements prepared by Lowell S. Hardin, Acting Secretary-Treasurer, for the period July 1, 1953 to June 30, 1954.

We have checked all disbursements recorded in the Disbursements Journal against the record of the check book. Although individual income entries were not checked, the total of gross receipts was verified as to its aggregate level. Both the cash receipts and cash disbursements books were found to be in balance. The treasurer's report of income and expenses and the financial statement for the period indicated were found to reflect accurately his records of the transactions and the financial position of the Association. The balance on the July 30, 1954 bank statement corresponded to the cash in bank figure of the Financial Statement. The securities belonging to the Association were found to be in order in the bank box.

Respectfully submitted,

R. L. STUCKY

H. G. DIESSLIN

REPORT OF THE EDITOR

Manuscripts continued to be submitted to the *Journal* in large number during 1954. On authorization of the Executive Committee the number of pages

in the regular issues of the *Journal* was increased, so as to include as many as possible of the worthy manuscripts. This has increased the cost of *Journal* printing. An increase in printing rates may require that the Executive Committee re-evaluate this policy and other alternatives for reducing costs in the future.

With the appointment of a new editor it is appropriate to review the three year term of the outgoing editor. The following changes have been made in the *Journal:* the increase in size already mentioned; the publication in May of the candidates' names and these titles for all Ph.D. degrees granted the previous year; the expansion of Books Received section to include bulletins and other monographs; the inclusion of an occasional Bulletin Review in the Book Review section; and the separation of the Proceedings issue into a separate December issue so as to expedite mailing the November issue on time. Some success was attained in encouraging more articles on extension, teaching, and agricultural policies and administration.

In the period, October 1951 to July 1954 excluding the Proceedings, 243 papers have been submitted to the editor. Data on submissions are not reported by earlier editors; but this appears to be a considerable increase. Of these papers 89 or 32 percent have been rejected, turned over to other journals or in other ways found unsuitable for the *Journal*. Nearly all of the rest have been revised, varying from changing a few lines or cutting a paragraph to revising a thirty page article into a short note. Published in the regular issues were 89 major papers and 65 notes from 137 different authors.

The two Proceedings issues averaged slightly over 400 pages. Together they included 80 articles and 37 discussions for a combined total of 117. Approximately 190 different authors will be represented in the three Proceedings issues, of whom only 37 were already represented in the regular issues. Thus about 290 different authors contributed to the pages of the *Journal* during this editor's three year term of office.

Adding the estimated 50 articles and 40 discussions of this week's program it is evident that the three Proceedings issues include more articles than do the regular issues. The Book Section, Ph.D. Theses and News Notes take up some of the space in the regular issues. If budget pressures force future retrenchment in the *Journal* it is suggested that space saving in the Proceedings issue is at least as appropriate as for the regular issues.

As before the editor owes a debt of gratitude for the assistance of Raleigh Barlowe and Harold Halcrow; to the members of the Editorial Council; and to the following individuals who have reviewed manuscripts from time to time: Richard Anderson, William Bredo, Gerald Engelman, Lowell Hardin, Roy Huffman, Sidney Hoos, Earl Houseman, Donald Ibach, Richard King, Margaret Reid, Walter Wilcox, as well as many members of the staff at Michigan State College.

I also want to thank the Editorial Council and associate editors for their efforts in selecting the Best Journal article each of the last three years. I hope the intellectual stimulation from some of the 200 articles and 3000 pages of reading included in the *Journal* has been an adequate recompense. They certainly should be included among the well-read members of our Association.

I am sure the new Editor and officers will appreciate suggestions from the membership on ways to further improve the *Journal*.

LAWRENCE WITT, *Editor*

REPORT OF COMMITTEE TO APPRAISE AWARDS PROGRAM AMERICAN FARM ECONOMIC ASSOCIATION

The Awards Program of the AFEA has been generally successful and merits consideration for being established as a permanent activity of the Association. It has proved its worth as an effective means of recognizing outstanding research and of encouraging young men engaged in the Agricultural Economics profession.

Sufficient experience has been gained with the conduct of the Program to substantiate the wisdom of several of the essential features that have been recommended and adopted such as:

1. Assigning responsibility for operating the program to a committee drawn from the membership of the Association.
2. Revolving the membership of this committee gradually over a period of three or four years to spread the work load and to broaden interest in the program.
3. Providing separate awards for (a) graduate theses, and (b) published reports.
4. Granting three awards each year for each of these classes and requiring that each of the three published reports receiving awards be in a different area of subject matter.
5. Limiting eligibility for the awards for published reports to persons 40 years of age or under at the time of publication.
6. Allotting time at the Annual Meeting of the Association for the presentation of the Awards at a general session during which opportunity is afforded for the recipients of the theses awards to review their research. This could well become a traditional feature of the meetings.

In view of the favorable experience thus far, your Review Committee recommends that the Association seek to build upon the foundation that has been laid by refining and improving the Program to assure its continuance. To achieve this objective, we cite the following problems and our recommendations for coping with them:

1. By far the most important problem is one of financing the program. It is presently financed with a fund solicited several years ago for this specific purpose. The fund is not sufficiently large to yield enough interest to support even the current modest Program. Since the capital is being depleted, the Program will continue only six more years unless the funds are replenished. It is, therefore, recommended that efforts be made to build up the funds to assure continuation of the Program over a longer period. This should be accomplished by solicitation of additional funds.

   A fund sufficiently large to yield interest to sustain the program might well be the long-time objective. At current rates of return on the investment, about $65,000 additional funds would be required. Your Committee believes however that such a goal should be regarded as an ultimate rather than an immediate objective and that final decision with respect to its adoption should await a further review of the Program in a few (not more than 5) years. Meanwhile the maintenance of at least $10,000 in the Special Grants Fund should be the minimum objective.
2. Such a wide variety of published research, ranging from brief articles or papers to comprehensive books, is thrown together for consideration that selection among them is exceedingly difficult and not entirely equitable. The most difficult problem is presented by books because the number presented for consideration does not warrant a separate classification each year. It is, therefore, recommended that a separate awards program for books be initiated on a three-year basis. This contemplates that books will be excluded from consideration in the annual awards, that an additional presentation of three awards will be made

every third year for books published within the three-year period, and that books on the subject of agricultural economics generally will be included without the requirement that they be judged as reports of research. This recommendation is made contingent upon the acquisition of an additional $10,000 for the Special Grants Fund of the Association.

3. In several instances, more than one award has been received by the same person. Under existing rules this cannot happen in any one year, but it may happen over a period of years. Repeated granting of awards to individuals tends to dampen the interest and participation that is sought, especially within particular areas of subject matter being considered. On the other hand, the objective of maintaining top quality entries and the fact that the awards are relatively small suggests that some repetition is warranted. It is, therefore, recommended that a maximum of two awards be established for any one person.

   In the event that a book award is established, it is recommended that a third award be permitted provided that the book does not in the opinion of the judges cover substantially the same material as an earlier award.

4. The character of the awards warrants attention. They are modest in comparison with those granted in other professions. Moreover, they are entirely monetary in character and provide no lasting evidence of achievement. It is, therefore, recommended that documentary evidence in the form of a certificate be presented to the recipients along with the checks.

Respectfully Submitted,

E. C. Young
O. V. Wells
Harry C. Trelogan, *Chairman*

AFEA AWARDS PROGRAM REPORT, AUGUST 25, 1954

Mr. President, as Chairman of the Finance Committee of the AFEA Awards Program, I wish to make the following progress report:

1. I would like to name the committee that is working on this assignment:
   (a) Ernest Baughman—Federal Reserve Bank, Chicago
   (b) Robert Kramer—Michigan State College, East Lansing
   (c) Dean McNeal—Pillsbury Mills, Minneapolis
   (d) Ed Savidge—American Bankers Association, New York
   (e) G. B. Wood—Oregan State College, Corvallis
   (f) Lou Zehner—Federal Reserve Bank, Boston
   (g) R. G. Bressler—University of California, Berkeley
   (h) Henry Arthur—Swift and Company, Chicago
   (i) Aubrey J. Brown—University of Kentucky, Lexington
   (j) F. L. Parsons—Federal Reserve Bank, Minneapolis

   Picked for its geographic distribution.
2. This committee is in the process of contacting some 400 organizations for contribution to the Awards Program.
3. As of August 16, 1954, sixteen organizations have made contributions from $25.00 to $250.00 with a grand total of $2,175.00. These sixteen firms are as follows:
   (a) Allied Chemical & Dye Corp., New York
   (b) Arcady Farms Milling Company, Chicago, Illinois
   (c) Dannen Mills, Inc., St. Joseph, Missouri
   (d) Deere and Company, Moline, Illinois
   (e) Green Giant Company, LeSueur, Minnesota

(f) Ford Motor Company, Detroit, Michigan
(g) Hubbard Milling Company, Mankato, Minnesota
(h) International Milling Company, Minneapolis, Minnesota
(i) International Minerals & Chemical Corporation, Chicago, Illinois
(j) Land O'Lakes Creamery, Inc., Minneapolis, Minnesota
(k) Michigan Farm Bureau, Lansing, Michigan
(l) Norris Grain Company, Chicago, Illinois
(m) F. H. Peavey Company, Minneapolis, Minnesota
also covers: Russell Miller Milling Co.
Van Dusen Harrington Co.
(n) Pillsbury Mills, Inc., Minneapolis, Minnesota
(o) The Farmer (Webb Publishing Company), Minneapolis, Minnesota
(p) Wallace's Farmer & Iowa Homestead, Des Moines, Iowa

4. The committee anticipates that a minimum of $5,000 will be raised during 1954—possibly more. Organizations that have made contributions in earlier years are not being solicited again in 1954.

As Chairman of this Committee I wish to make the following recommendations to the Executive Committee.

1. That the names of all donors to the Awards Program be printed in the annual issue of the *Journal of Farm Economics*.
2. That a copy of the *Journal* containing the announcement of awards made in 1954 and a list of names of contributors be mailed to all firms and organizations that have made donations to the Awards Program.

F. L. PARSONS, *Chairman*

MINUTES OF THE EXECUTIVE COMMITTEE MEETING, AUGUST 25, 1954

Present: Ackerman, Cochrane, Cowden, Bottum, Witt, Halcrow, Bressler, Hardin and Mutti.

The meeting was called to order by President Ackerman. The 1954-55 budget for the Association was accepted as follows:

BUDGET FOR 1954-55
AMERICAN FARM ECONOMIC ASSOCIATION

	Actual 1953-54	Budget for 1954-55
Income		
Dues	$12,320.71	$12,500
Back numbers sold	1,046.25	1,100
Reprints sold	812.46	800
Advertising	300.00	300
Annual meeting	145.56	0
Collected for WFEA	314.50	350
Collected for CAES	216.50	200
Collected for Student Section	20.40	0
Dividends and Interest	2,920.25	3,000
Other	44.51	100
Total	$18,141.14	$18,350
Expenses		
Journal Printing	$12,147.22	$13,600
Reprints	1,162.60	1,300
Back Numbers	50.00	500
Postage	151.70	200
Annual Meeting	895.27	500
Editorial Expense	402.50	800
Office Supplies	422.76	400
Paid to WFEA	325.50	350
Paid to CAES	51.91	200
Student Section	0	0
Adjustment for bad checks	38.50	0
Other	140.27	200
Interest earnings allocated to Special Grants Fund	275.52	300
Total	$16,063.75	$18,350
Net Gain	$ 2,077.39	$ 0

Ackerman was authorized to reconstitute the committee on investments.

A certified public accountant audit of the treasurer's book was authorized. President Ackerman was authorized to bring to the Executive Committee such recommendations as he sees fit concerning the long-time financial welfare of the Association.

The new Executive Council reaffirmed the action of the previous Executive Committee concerning acceptance of funds for special awards in highly spe-

cialized areas. The invitation from the National Conference on FAO to appoint an official representative of AFEA to their organization was declined.

President Ackerman was authorized to proceed in any way he sees fit in the development of a plan to obtain funds which would encourage graduate students to attend and participate in the annual meetings.

The committee accepted the invitation of Michigan State College to hold the next annual AFEA meetings in East Lansing the week of August 1 to 6, 1955. (Later specified as August 1 through 3.)

The president was authorized to appoint a membership chairman for each state if he saw fit to do so.

The existing policy of the Association concerning expense allowances for the *Journal* Editor and Secretary-Treasurer to attend the annual meetings of the Association was reaffirmed. These two receive from the Association the equivalent of first class railroad fare plus cash expenses while in attendance at the annual meeting.

Adjournment.

L. S. HARDIN, *Secretary-Treasurer*

INDEX TO VOLUME XXXVI

1954

SUBJECTS

Activity Analysis, Selection of Livestock Enterprises by, 78
Address of Welcome, 737
Agricultural Administration
  Fragmentation of the BAE, 1
  Republican Department of Agriculture—A Political Interpretation, 210
Agricultural Data
  Agricultural Data Requirements—National, State, and County, 1226
  Plans for the 1954 Census of Agriculture, 1240
  Discussions: 1247, 1251
Agricultural Development, Function of Land Economics in, 1161
Agricultural Economics in the Decade Ahead, 817
Agricultural Economists Working With Industry
  How Should the Industrial Economist Operate for the Best Long-Time Results?, 916
  Needed Training and Opportunities for the Industrial Economist, 921
  Problems of the Economist Working With Organizations, 928
  Discussions: 926, 941
Agricultural Labor
  Manpower Situation in Southern Agriculture, 52
  Underemployment of Labor in Southeastern Agriculture, 258
Agricultural Marketing
  Economic Efficiency in California Pear-Packing Plants, 1276
  Lines of Advance in Research in Marketing, 1061
  Marketing Hogs on the Chicago Market, 611
  More Economical Cottonseed Oil Mills and Returns to Growers, 428
  Needed Developments in Economic Theory for Use in Marketing, 1051
  See also Dairy Marketing, Consumption Economics, Marketing Extension
Agricultural Policy
  British Post-War Policy Towards Farm Mechanization, 98
  Fragmentation of the BAE, 1
  On Letting Go of the Bear's Tail, 30
  Political Strategy of Agriculture, 375
  Progress Calls for Readjustment, 22
  Proposed New Directions in World Agricultural Policy, 402
  Republican Department of Agriculture—A Political Interpretation, 210
  Study of the Nature and Cost of Government Programs Affecting Potatoes and Their Impact on Inter-Market Relationships, 1281
Agricultural Price Policy
  Fundamental Issues That Must Be Faced in Agricultural Price Programs, 760
  Instability of Farm Prices Reconsidered, 777
  Discussions: 771, 774, 786, 788
Agricultural Production
  Effects of Changes in Prices, Inputs and Efficiency on Farm Incomes (1937-39 to 1948-50), 590
  Needed Adjustments in Farming, 387
  Sources of our Increasing Food Supply, 228
Agriculture and Competitive Structure, 743

British Post-War Policy Towards Farm Mechanization, 98
Buying Milk on a Solids-Not-Fat Basis
  Place of Fat and Solids-Not-Fat in Pricing Market Milk, 1121
  Place of Fat and Solids-Not-Fat in Pricing Milk for Manufacturing, 1107
  Discussion: 1118, 1131

Case for the Mail Survey, 575
Changes in Prices, Inputs and Efficiency on Farm Incomes (1937-39 to 1948-50), Effects of, 590
Citriculture in Israel, Planning for, 654
Combating Uncertainty in Agricultural Production, 87
Comparison of Farm Management Farms and a Random Sample of Farms in Western Illinois, 285
Competition
  Agriculture and Competitive Structure, 743
  Is Competition Decreasing in our Economy?, 751

Considerations in Evaluating the Effects of Foreign Aid Programs on Trade in Farm Products, 961
Consumption Economics
Demand Analysis from the M.S.C. Consumer Panel, 415
Place of Consumer and Retailer Education in Marketing Farm Products, 1094
Progress in Developing a Set of Principles in the Area of Consumer Behavior, 1071
Some Phases of Consumer-Preferences and Demand Research, 641
Cost Allocation in Relation to Western Water Policies, 108
Cost Reduction, Farm Cost Structure and Opportunities for, 991
Credit Needs of Agriculture, Re-examination of the, 1200
Critical Problems of Young Families in Getting Established in Farming, 1011
Current and Prospective Foreign Trade Situation With Respect to Farm Products, 973
Current Guides as to Safe Debt Loads for Farmers, 1216

Dairy Marketing
Place of Fat and Solids-Not-Fat in Pricing Market Milk, 1121
Place of Fat and Solids-Not-Fat in Pricing Milk for Manufacturing, 1107
Theoretical Aspects of a Two-Price Plan to Sell More Milk, 620
Demand Analysis from the M.S.C. Consumer Panel, 415
Demand Research and Consumer-Preferences, Some Phases of, 641
Developing a Set of Basic Principles for Economic Extension, 894

Economic Development and Adjustments in Southeastern Low Income Agriculture, 1146
Economic Efficiency in California Pear-Packing Plants, 1276
Economic Framework for Watershed Development, 1170
Economic Models in Appraising Foreign Trade Policies, Use of, 941
Economic Rating of Soils for Tax Assessment, 483
Economics of Ground-Water Mining, 600
Effects of Changes in Prices, Inputs and Efficiency on Farm Incomes (1937-39 to 1948-50), 590
Estimate Gross Income and Marginal Value Products, Method of Showing Farmers How to, 66
Extension
Developing a Set of Basic Principles for Economic Extension, 894
Farm Planning—A Trial Operation, 198
How Extension People Can Use "Recent" Economic Principles Including Marginal Concepts, 904
Improving Agricultural Economics Extension in the Decade Ahead, 884
Integration of Programs—A Challenge to Marketing Research and Extension, 1083
Place of Consumer and Retailer Education in Marketing Farm Products, 1094
Problems of a Farm and Home Planning Program, 187

Farm and Home Planning Program, Problems of a, 187
Farm Cost Structure and Opportunities for Cost Reduction, 991
Farm Credit
Current Guides as to Safe Debt Loads for Farmers, 1216
Re-examination of the Credit Needs of Agriculture, 1200
Discussions: 1212, 1223
Farm Management
Comparison of Farm Management Farms and a Random Sample of Farms in Western Illinois, 285
Critical Problems of Young Families in Getting Established in Farming, 1011
Farm Cost Structure and Opportunities for Cost Reduction, 991
Farm Planning—A Trial Operation, 198
Impact of Higher Expense Ratios to Agriculture, 1002
Industrial Management Techniques in Agriculture, 565
Problems and Possible Solutions in Determining Input-Output Relationships in Agricultural Enterprises, 1024
Problems of a Farm and Home Planning Program, 187
Simplified Presentation and Logical Aspects of Linear Programming Technique, 1035

Discussions: 1000, 1008, 1021, 1033, 1048
See also Production Economics
Farm Planning—A Trial Operation, 198
Fertilizer Production Surface With Specification of Economic Optima for Corn Grown on Calcareous Ida Silt, 466
Flexibility and Diversification as a Means of Meeting Price and Yield Uncertainty in Western Kansas, 273
Food Supply, Sources of our Increasing, 228
Foreign Agriculture
British Post-War Policy Towards Farm Mechanization, 98
Planning for Citriculture in Israel, 654
Proposed New Directions in World Agricultural Policy, 402
Resource Productivity and Development Policy for Greek Agriculture, 293
Foreign Trade
Considerations in Evaluating the Effects of Foreign Aid Programs on Trade in Farm Products, 961
Current and Prospective Foreign Trade Situation With Respect to Farm Products, 973
Use of Economic Models in Appraising Foreign Trade Policies, 944
Discussions: 958, 971, 990
Fragmentation of the BAE, 1
Function of Land Economics in Agricultural Development, 1161
Fundamental Issues That Must Be Faced in Agricultural Price Programs, 760

Generalization Versus Specialization in Graduate Training, 1253
Getting Established in Farming, Critical Problems of Young Families in, 1011
Graduate Student Section
Generalization Versus Specialization in Graduate Training, 1253
New Horizons in Agricultural Economics, 1264
Discussions: 1260, 1261, 1271, 1274
Greek Agriculture, Resource Productivity and Development Policy for, 293
Guideposts in Teaching Economics to Beginners, 867

How Competitive is our Economy?
Agriculture and Competitive Structure, 743
Is Competition Decreasing in our Economy?, 751
Discussions: 747, 758

Impact of Higher Expense Ratios to Agriculture, 1002
Improved Teaching Techniques, 877
Improving Agricultural Economics Extension
Developing a Set of Basic Principles for Economic Extension, 894
How Extension People Can Use "Recent" Economic Principles Including Marginal Concepts, 904
Improving Agricultural Economics Extension in the Decade Ahead, 884
Discussions: 901, 914
Improving Agricultural Economics in the Decade Ahead
Agricultural Economics in the Decade Ahead, 817
Mistakes and Lessons in Agricultural Economics in the Last 25 Years, 806
Improving Agricultural Economics Research
Integration of Economic Research and Problems Encountered, 841
Major Opportunities for Improving Agricultural Economics Research in the Decade Ahead, 829
Use of Mathematics and Econometrics in our Research Work, 852
Discussions: 850, 858
Improving Agricultural Economics Teaching
Some Guideposts in Teaching Economics to Beginners, 867
Improved Teaching Techniques, 877
Some Observations on Teaching, 861
Discussions: 874, 882
Industrial Management Techniques in Agriculture, 565
Input-Output Relationships in Agricultural Enterprises, Problems and Possible Solutions in Determining, 1024
Instability of Farm Prices Reconsidered, 777
Institutional Arrangements for Watershed Programs, 1184
Integration of Economic Research and Problems Encountered, 841
Integration of Programs—A Challenge to Marketing Research and Extension, 1083
Interrelationships of Economic and Agronomic Concepts, 453
Irrigation
Cost Allocation in Relation to Western Water Policies, 108

Economics of Ground-Water Mining, 600
Reclamation Under the Desert-Land Act, 500
Is Competition Decreasing in our Economy?, 751

Journal of Farm Economics—It's First 35 Years, 441

Land Economics
Economic Framework for Watershed Development, 1170
Function of Land Economics in Agricultural Development, 1161
Institutional Arrangements for Watershed Programs, 1184
Discussion: 1197
Level-of-Living Indexes and the Average Incomes of Farm Operators, 44
Linear Programming Technique, Simplified Presentation and Logical Aspects of, 1035
Lines of Advance in Research in Marketing, 1061
Long-Term Price Outlook and Agriculture
Long-Term Price Outlook and Its Impact on American Agriculture, 790
Discussions: 799, 801
Long-Term Price Outlook and Its Impact on American Agriculture, 790
Low Income Areas in Agriculture
Economic Development and Adjustments in Southeastern Low Income Agriculture, 1146
Size and Distribution of the Income of Farm People in Relation to the Low Income Problem, 1134
Discussions: 1144, 1158

Mail Survey, Case for the, 575
Major Opportunities for Improving Agricultural Economics Research in the Decade Ahead, 829
Manpower Situation in Southern Agriculture, 52
Marketing
Lines of Advance in Research in Marketing, 1061
Needed Developments in Economic Theory for Use in Marketing, 1051
Progress in Developing a Set of Principles in the Area of Consumer Behavior, 1071
Discussions: 1058, 1068, 1081
See also Agricultural Marketing
Marketing Extension
Integration of Programs—A Challenge to Marketing Research and Extension, 1083
Place of Consumer and Retailer Education in Marketing Farm Products, 1094
Discussions: 1091, 1104
Marketing Hogs on the Chicago Market, 611
Mechanization, British Post-War Policy Towards Farm, 98
Method of Showing Farmers How to Estimate Gross Income and Marginal Value Products, 66
Mistakes and Lessons in Agricultural Economics in the Last 25 Years, 806
More Economical Cottonseed Oil Mills and Returns to Growers, 428

Needed Adjustments in Farming, 387
Needed Developments in Economic Theory for Use in Marketing, 1051
Needed Training and Opportunities for the Industrial Economics, 921
New Horizons in Agricultural Economics, 1264

Observations on Teaching, 861
On Letting Go of the Bear's Tail, 30
Outlook and Its Impact on American Agriculture, 790

Place of Consumer and Retailer Education in Marketing Farm Products, 1094
Place of Fat and Solids-Not-Fat in Pricing Market Milk, 1121
Place of Fat and Solids-Not-Fat in Pricing Milk for Manufacturing, 1107
Planning for Citriculture in Israel, 654
Plans for the 1954 Census of Agriculture, 1240
Political Strategy of Agriculture, 375
Potatoes, Study of the Nature and Cost of Government Programs Affecting, 1281
Problems and Possible Solutions in Determining Input-Ouput Relationships in Agricultural Enterprises, 1024
Problems of a Farm and Home Planning Program, 187
Problems of the Economist Working With Organizations, 928
Production Economics
Combating Uncertainty in Agricultural Production, 87

Fertilizer Production Surface With Specification of Economic Optima for Corn Grown on Calcareous Ida Silt Loam, 466
Flexibility and Diversification as a Means of Meeting Price and Yield Uncertainty in Western Kansas, 273
Method of Showing Farmers How to Estimate Gross Income and Marginal Value Products, 66
Problems and Possible Solutions in Determining Input-Output Relationships in Agricultural Enterprises, 1024
Resource Productivity and Development Policy for Greek Agriculture, 292
Resource Returns and Productivity Coefficients in Selected Farming Areas, 243
Selection of Livestock Enterprises by Activity Analysis, 78
Simplified Presentation and Logical Aspects of Linear Programming Technique, 1035
Some Interrelationships of Economic and Agronomic Concepts, 453
See also Farm Management
Progress Calls for Readjustment, 22
Progress in Developing a Set of Principles in the Area of Consumer Behavior, 1071
Proposed New Directions in World Agricultural Policy, 402

Readjustment, Progress Calls for, 22
Reclamation Under the Desert-Land Act, 500
Re-examination of the Credit Needs of Agriculture, 1200
Regressions and Test Procedures, Use of, 633
Relationship Between the BAE Level-of-Living Indexes and the Average Incomes of Farm Operators, 44
Republican Department of Agriculture—A Political Interpretation, 210
Research
Integration of Economic Research and Problems Encountered, 841
Lines of Advance in Research in Marketing, 1061
Major Opportunities for Improving Agricultural Economics Research in the Decade Ahead, 829
Use of Mathematics and Econometrics in our Research Work, 852
Research in Marketing, Lines of Advance in, 1061
Resource Productivity and Development Policy for Greek Agriculture, 293
Resource Returns and Productivity Coefficients in Selected Farming Areas, 243

Safe Debt Loads for Farmers, Current Guides as to, 1216
Selection of Livestock Enterprises by Activity Analysis, 78
Simplified Presentation and Logical Aspects of Linear Programming Technique, 1035
Size and Distribution of the Income of Farm People in Relation to the Low Income Problem, 1134
Some Phases of Consumer-Preferences and Demand Research, 641
Sources of our Increasing Food Supply, 228
Southern Agriculture, Manpower Situation in, 52
Statistics and Statistical Measurement
Agricultural Data Requirements—National, State, and County, 1226
Case for the Mail Survey, 575
Relationship Between the BAE Level-of-Living Indexes and the Average Incomes of Farm Operators, 44
Selection of Livestock Enterprises by Activity Analysis, 78
Simplified Presentation and Logical Aspects of Linear Programming Technique, 1035
Use of Mathematics and Econometrics in our Research Work, 852
Use of Regressions and Test Procedures, 633
Study of the Nature and Cost of Government Programs Affecting Potatoes and Their Impact on Inter-Market Relationships, 1281

Tax Assessment, Economic Rating of Soils for, 483
Teaching
Some Guideposts in Teaching Economics to Beginners, 867
Improved Teaching Techniques, 877
Some Observations on Teaching, 861

Theoretical Aspects of a Two-Price Plan to Sell more Milk, 620

Uncertainty in Agricultural Production, 87
Uncertainty in Western Kansas, Flexibility and Diversification as a Means of Meeting Price and Yield, 273
Underemployment of Labor in Southeastern Agriculture, 258
Use of Economic Models in Appraising Foreign Trade Policies, 944
Use of Mathematics and Econometrics in our Research Work, 852
Use of Regressions and Test Procedures, 633

Water Policies, Cost Allocation in Relation to Western, 108
Watershed Development, Economic Framework for, 1170
Watershed Programs, Institutional Arrangements for, 1184

AUTHORS

(Articles are indicated by asterisks)

Aandahl, Andrew R.
*Economic Rating of Soils for Tax Assessment, 483
Ackerman, Joseph
See Reviews, 358
Ahlgren, Henry L.
*Agricultural Data Requirements—National, State, and County, 1226
Allen, Stephen Q.
*Some Interrelationships of Economic and Agronomic Concepts, 453
Appleby, Paul H.
*Fragmentation of the BAE, 8
Arnold, Carl J.
*Journal of Farm Economics—It's First 35 Years, 441
Arthur, Henry B.
*How Should the Industrial Economist Operate for the Best Long-Time Results?, 916

Bachman, Kenneth L.
*Farm Cost Structure and Opportunities for Cost Reduction, 991
Bailey, Rex R.
*Current Guides as to Safe Debt Loads for Farmers, 1216
Barlowe, Raleigh
*Journal of Farm Economics—It's First 35 Years, 441
Barton, Glen T.
*Farm Cost Structure and Opportunities for Cost Reduction, 991
Baughman, Ernest T.
See Reviews, 724
Baum, E. L.
See Notes, 135
Beck, Frank V.
Discussion: Agricultural Data, 1251
Beneke, Raymond R.
Discussion: Improving Agricultural Economics Extension, 901
See Notes, 523
Bishop, Charles E.
*Economic Development and Adjustments in Southeastern Low Income Agriculture, 1146
*Underemployment of Labor in Southeastern Agriculture, 258
Black, Guy
See Reviews, 707
Black, John D.
*Farming Planning—A Trial Operation, 198
*Fragmentation of the BAE, 5
*Lines of Advance in Research in Marketing, 1061
Boger, L. L.
Discussion: Long-Term Price Outlook and Agriculture, 801
See Notes, 304
Bottum, J. Carroll
*Developing a Set of Basic Principles for Economic Extension, 894
Bowlen, Bernard J.
*Generalization Versus Specialization in Graduate Training, 1253
Boyd, Virlyn A.
See Reviews, 726
Bradford, Lawrence A.
*Critical Problems of Young Families in Getting Established in Farming, 1011
Brandow, G. E.
Discussion: Agricultural Price Policy, 771
Breimyer, Harold F.
*Sources of our Increasing Food Supply, 228
See Notes, 680

Brekke, Arnold
See Notes, 316
Brewster, John M.
*More Economical Cottonseed Oil Mills and Returns to Growers, 428
Brinegar, George K.
*On Letting Go of the Bear's Tail, 30
Brooker, Marvin A.
See, Reviews, 544
Brown, Dorris D.
*Problems of a Farm and Home Planning Program, 187
See Reviews, 362
Buddemeier, W. D.
Discussion: Improving Agricultural Economics Teaching, 874
Burmeister, Gustave
*Current and Prospective Foreign Trade Situation With Respect to Farm Products, 973
Butler, Charles P.
See Reviews, 709

Capel, George L.
Discussion: Graduate Student Section, 1271
Castle, Emery N.
*Flexibility and Diversification as a Means of Meeting Price and Yield Uncertainty in Western Kansas, 273
Christensen, R. P.
*Needed Adjustments in Farming, 387
Christian, W. E., Jr.
Discussion: Agricultural Price Policy, 774
Ciriacy-Wantrup, S. V.
*Cost Allocation in Relation to Western Water Policies, 108
Clifton, E. S.
*Marketing Hogs on the Chicago Market, 611
See Notes, 688
Clodius, Robert L.
*Needed Developments in Economic Theory for Use in Marketing, 1051
See Reviews, 543
Cochrane, Willard W.
*Agricultural Economics in the Decade Ahead, 817
Conklin, Howard E.
See Notes, 147, 327
Cook, Hugh L.
*Place of Fat and Solids-Not-Fat in Pricing Milk for Manufacturing, 1107
Corbridge, I. L.
See Notes, 135
Coutsoumaris, George
*Resource Productivity and Development Policy for Greek Agriculture, 293
Crow, William C.
Discussion: Marketing, 1068
Currie, J. R.
See Reviews, 549

Daly, Rex F.
Discussion: Low Income Areas in Agriculture, 1144
Davis, Lloyd
*Integration of Programs—A Challenge to Marketing Research and Extension, 1083
DeGraff, Herrell
*Some Observations on Teaching, 861
Diesslin, Howard G.
*Re-Examination of the Credit Needs of Agriculture, 1200
Drake, Louis S.
*Method of Showing Farmers How to Estimate Gross Income and Marginal Value Products, 66
Dougan, Riley S.
*New Horizons in Agricultural Economics, 1264
Ducoff, Louis J.
*Manpower Situation in Southern Agriculture, 52

Ebling, Walter H.
*Agricultural Data Requirements—National, State, and County, 1226
Eggert, R. J.
*Needed Training and Opportunities for the Industrial Economist, 921
Engberg, R. C.
See Reviews, 556
Engelbert, Ernest A.
*Political Strategy of Agriculture, 375
Erdman, H. E.
*Progress Calls for Readjustment, 22
Erdman, H. H.
Discussion: Agricultural Economists Working With Industry, 941
Ezekial, Mordecai
*Proposed New Directions in World Agricultural Policy, 402

Foote, Richard J.
Discussion: Improving Agricultural Economics Research, 858
Ford, Richard G.
*How Extension People Can Use "Recent" Economic Principles Including Marginal Concepts, 904

Foster, John
See Notes, 132
Fox, Karl A.
*Use of Economic Models in Appraising Foreign Trade Policies, 944
Fox, Kirk
*Selection of Livestock Enterprises by Activity Analysis, 78
French, B. C.
*Economic Efficiency in California Pear-Packing Plants, 1276
Fuller, Varden
See Reviews, 179

Galbraith, J. K.
*Agriculture and Competitive Structure, 743
Gibson, W. L., Jr.
*Improved Teaching Techniques, 877
Goodwin, Dorothy C.
See Reviews, 181

Halcrow, Harold G.
*Function of Land Economics in Agricultural Development, 1161
See Reviews, 546
Halter, Albert N.
Discussion: Graduate Student Section, 1260
Hardin, C. M.
*Republican Department of Agriculture—A Political Interpretation, 210
Hardin, Lowell S.
Discussion: Agricultural Economists Working With Industry, 926
See Reviews, 351
Halvorson, Harlow W.
Discussion: Agricultural Price Policy, 786
Halvorson, Lloyd C.
*Problems of the Economist Working With Organizations, 928
Heady, Earl O.
*Fertilizer Production Surface With Specification of Economic Optima for Corn Grown on Calcareous Ida Silt Loam, 466
*Resource Returns and Productivity Coefficients in Selected Farming Areas, 243
*Simplified Presentation and Logical Aspects of Linear Programming Technique, 1035
Hedlund, G. W.
See Reviews, 168
Heer, John F.
See Notes, 143
Hendrix, W. E.
*Size and Distribution of the Income of Farm People in Relation to the Low Income Problem, 1134
Herr, William McD.
See Notes, 519
Herrmann, Louis F.
Discussion: Buying Milk on a Solids-Not-Fat Basis, 1131
Hicks, John W.
See Reviews, 703
Hildreth, Clifford
*Use of Mathematics and Econometrics in our Research Work, 852
See Reviews, 539
Hollands, Harold F.
See Reviews, 175
Holton, Richard H.
See Reviews, 172
Hoover, Calvin B.
*Fundamental Issues That Must be Faced in Agricultural Price Programs, 760
Howell, L. D.
*Some Phases of Consumer-Preferences and Demand Research, 641
Hughes, R. B., Jr.
See Notes, 334
Hummel, Claude
*Impact of Higher Expense Ratios to Agriculture, 1002
Hurley, Ray
*Plans for the 1954 Census of Agriculture, 1240

Jackson, Lyman E.
*Address of Welcome, 737
Jacobs, E. M.
*Marketing Hogs on the Chicago Market, 611
See Notes, 688
Jessen, R. J.
*Marketing Hogs on the Chicago Market, 611
See Notes, 688
Johnson, D. Gale
See Reviews, 350
Johnson, Glenn L.
*Major Opportunities for Improving Agricultural Economics Research in the Decade Ahead, 829
See Notes, 130
Johnson, Sherman E.
Discussion: Long-Term Price Outlook and Agriculture, 799
Johnson, Stewart

*On Letting Go Of the Bear's Tail, 30
Discussion: Buying Milk on a Solids-Not-Fat Basis, 1118
Jones, Edwin B.
*Theoretical Aspects of a Two-Price Plan to Sell More Milk, 620

Kantner, John F.
See Reviews, 712
Karpoff, Edward
See Reviews, 177
Katz, Saul M.
See Reviews, 359
King, Richard A.
See Reviews, 541
Knapp, Joseph G.
See Reviews, 353
Koffsky, Nathan
*Long-Term Price Outlook and Its Impact on American Agriculture, 790
Kramer, Robert C.
*Case for the Mail Survey, 575
See Reviews, 346
Kritjanson, B. H.
See Reviews, 165
Kutish, L. John
See Notes, 666

Lamer, Mirko
See Reviews, 170
Landstrom, Karl S.
*Reclamation Under the Desert-Land Act, 500
Larson, Adlowe L.
Discussion: Marketing, 1058
Lee, J. Kari
See Reviews, 704
Levie, E. L.
*Planning for Citriculture in Israel, 654
Long, Erven J.
See Notes, 671
Lowenstein, Frank
See Notes, 674

McNeely, John G.
Discussion: Improving Agricultural Economics Teaching, 882
McPherson, W. W.
See Notes, 139
See Reviews, 710
Mehren, George L.
See Reviews, 554
Meissner, Frank
See Reviews, 361, 555, 719
Mellor, John W.
*British Post-War Policy Towards Farm Mechanization, 98
Metz, Joseph F., Jr.
Discussion: Graduate Student Section, 1261
Miller, Frank
Discussion: Farm Credit, 1212
Miller, L. F.
Discussion: Improving Agricultural Economics Extension, 914
Montgomery, George
Discussion: Agricultural Price Policy, 788
Motheral, Joe R.
*Manpower Situation in Southern Agriculture, 52
Muehlbeier, John
*Institutional Arrangements for Watershed Programs, 1197
Mueller, Allan G.
*Comparison of Farm Management Farms and a Random Sample of Farms in Western Illinois, 285
Murray, William G.
*Economic Rating of Soils for Tax Assessment, 483
Discussion: Foreign Trade, 990
Myrick, D. C.
See Notes, 692

Norton, L. J.
Discussion: How Competitive is our Economy?, 747
See Reviews, 343
Nutter, G. Warren
*Is Competition Decreasing in our Economy?, 751
Nybroten, Norman
Discussion: Marketing, 1081

Parry, Stanton P.
See Notes, 519
Penn, Raymond J.
*Fragmentation of the BAE, 16
Discussion: Marketing Extension, 1104
Perregaux, E. A.
Discussion: Foreign Trade, 971
Pesek, John
*Fertilizer Production Surface With Specification of Economic Optima for Corn Grown on Calcareous Ida Silt Loam, 466
Pierce, C. W.
*Place of Fat and Solids-Not-Fat in Pricing Market Milk, 1121
Pierce, Walter H.
See Notes, 512
See Reviews, 362

Pine, Wilfred H.
See Notes, 330
See Reviews, 166
Plaxico, James S.
Discussion: Farm Management, 1048
Pond, George A.
Discussion: Farm Credit, 1223

Quackenbush, G. G.
*Demand Analysis from the M.S.C. Consumer Panel, 415

Ratchford, C. B.
*Improving Agricultural Economics Extension in the Decade Ahead, 884
Rauchenstein, Emil
See Notes, 517
Redman, John C.
*Interrelationships of Economic and Agronomic Concepts, 453
*Problems and Possible Solutions in Determining Input-Output Relationships in Agricultural Enterprises, 1024
See Notes, 323
Reiss, F. J.
Discussion: Farm Management, 1021
Ruttan, Vernon W.
*Relationship Between the BAE Level-of-Living Indexes and the Average Incomes of Farm Operators, 44
Discussion: Low Income Areas in Agriculture, 1158

Savage, Job K.
See Notes, 529
Scholtes, Wayne
*Economic Rating of Soils for Tax Assessment, 483
Schultz, Theodore W.
*Fragmentation of the BAE, 18
*Instability of Farm Prices Reconsidered, 777
Schumaier, C. P.
Discussion: Graduate Student Section, 1274
Scott, F. S., Jr.
See Notes, 526
Sen, S. R.
See Reviews, 721
Shaffer, James D.
*Case for the Mail Survey, 575
See Notes, 153
Shaw, Russell
*Resource Return and Productivity Coefficients in Selected Farming Areas, 243
Smith, Cecil N.
Discussion: Foreign Trade, 958
Smith, Mervin G.
See Reviews, 552
Smith, R. K.
Discussion: Agricultural Data, 1247
Snyder, J. Herbert
*Economics of Ground-Water Mining, 600
Sorenson, Vernon L.
*Study of the Nature and Cost of Government Programs Affecting Potatoes and Their Impact on Inter-Market Relationships, 1281
Southworth, Herman M.
*Progress in Developing a Set of Principles in the Area of Consumer Behavior, 1071
Spielman, Henry W.
See Reviews, 714
Staniforth, Sydney D.
*Combating Uncertainty in Agricultural Production, 87
See Notes, 686
Stewart, Clyde E.
See Notes, 692
Stine, O. C.
*Mistakes and Lessons in Agricultural Economics in the Last 25 Years, 806
Swanson, Earl R.
*Selection of Livestock Enterprises by Activity Analysis, 78
Discussion: Improving Agricultural Economics Research, 850

Taylor, H. C.
*Fragmentation of the BAE, 12
Thompson, Layton S.
See Reviews, 356
Timm, Tyrus R.
Discussion: Marketing Extension, 1091
Timmons, John F.
*Economic Framework for Watershed Development, 1170
Tolley, Howard R.
*Fragmentation of the BAE, 14
Tontz, Robert L.
See Notes, 309
Tramel, Thomas E.
Discussion: Farm Management, 1008
Trelogan, Harry C.
*Integration of Economic Research and Problems Encountered, 841

Ueland, Gale
*Place of Consumer and Retailer Education in Marketing Farm Products, 1094

Vermeer, James
*Effects of Changes in Prices, Inputs and Efficiency on Farm Incomes (1937-39 to 1948-50), 590
Voelker, Stanley W.
*Institutional Arrangements for Watershed Programs, 1184

Wall, Norman J.
See Reviews, 548
Warren, S. W.
Discussion: Farm Management, 1033
Wells, O. V.
*Fragmentation of the BAE, 1
Wertz, Virgil R.
*Guideposts in Teaching Economics to Beginners, 867
West, Quentin M.
See Notes, 147
Wheeler, R. G.
*Farm Planning—A Trial Operation, 198
Wiegmann, Fred H.
*Use of Regressions and Test Procedures, 633
Wilcox, Walter W.
Discussion: How Competitive is our Economy?, 758
See Notes, 509
Williams, Moyle S.
See Notes, 512
Wills, J. E.
*Industrial Management Techniques in Agriculture, 565
Wilson, M. L.
See Reviews, 348
Witt, Lawrence
*Considerations in Evaluating the Effects of Foreign Aid Programs on Trade in Farm Products, 961
Woodworth, Roger C.
Discussion: Farm Management, 1000

Yang, Martin M. C.
See Reviews, 716
Young, Gladwin E.
Discussion: Land Economics, 1197

NOTES

Accuracy of Iowa Farm Outlook Information, 143
Amount and Source of Shrink and Fill in Marketed Hogs, 688

Commentary on Kristjanson, 330
Comment on "Economic Nature of the Cooperative Association," 529
Comparative Precision of Alternative Sampling Designs for Farm Management and Land Economic Surveys, 147

Data Needed for Soil Conservation Economics Policy, 309
Degree of Correspondence Between the Concept of Marginal Physical Productivity and Its Empirical Referrents, 316
Distribution and Use of Irrigation Research Results, 692

Economic Analysis of the Optimum Level of Crowding the Laying Flock, 523
Effect of a Decrease in the Price of Butterfat on the Relative Profitability of Type of Dairy Cow, 686
Effect of Feed Price Stabilization Programs on Livestock, 680

Firm and Interdependency Among Firms, 139
Further Note on Forage-Grain Substitution, 517

Household Income, Food Expenditures and Desires in Seattle, Washington, 135

Important Professional Problems Facing the Agricultural Economist, 304
Is India Overpopulated?, 132

Marginal Returns on Agricultural Resources in a Southern Mountain Valley, 334
Methodological Issues in Research in Feeding for Economic Milk Production, 323
Methods of Increasing Domestic Consumption of Farm Products, 509

Note on the Derivation of a Short-Run Supply Curve, 519

Note on Rauchenstein's Article and McMillan's Note, 130

Observational Designs for the Social Sciences, 327

Plan for Sampling a Changing Population Over Time, 153

Reply to Kutish's "The Value Question," 671

Some Bases for and Objectives of Farm Management Extension Work, 512

Some Weaknesses in the Use of Imputed Values for Unpaid Family Labor and Family Living Allowance in Determining Payment Capacity, 526

Value Question, 666

Variations in Crop Forecasts for Cotton, 674

REVIEWS

Anderson, Oscar Edward, Jr., *Refrigeration in America: A History of a New Technology and Its Impact* (Karpoff, Edward), 177

Baade, Fritz, *Brot für ganz Europa* (Lamer, Mirko), 170

Barclay, George W., *Colonial Development and Population in Taiwan* (Yang, Martin M. C.), 716

Bennett, M. K., *The World's Food* (Johnson, D. Gale), 350

Blaisdell, Thomas C., et al., *Farm Credit in Underdeveloped Areas* (Engberg, R. C.), 556

Brandt, Karl, et al., *Management of Agriculture and Food in the German-Occupied and Other Areas of Fortress Europe, A Study in Military Government* (Katz, Saul M.), 359

Brown, William Adams, Jr., and Redvers Opie, *American Foreign Assistance* (Smith, Mervin, G.), 552

Burns, Arthur F., *The Frontiers of Economic Knowledge* (Clodius, Robert L.), 543

Case, H. C. M. and Paul E. Johnston, *Principles of Farm Management* (Hardin, Lowell S.), 351

Chauhan, D. S., *Agricultural Economics* (Meissner, Frank), 361

Chazeau, Melvin G. de, *Regularization of Business Investment; A Conference of the Universities-National Bureau Committee for Economic Research* (Black, Guy), 707

Efferson, J. Norman, *Principles of Farm Management* (King, Richard A.), 541

Finney, D. J., *An Introduction to Statistical Science in Agriculture* (McPherson, W. W.), 710

Fite, Gilbert C., *George N. Peek and the Fight for Farm Parity* (Halcrow, Harold G.), 546

Forster, G. W., *Farm Organization and Management* (Brown, Dorris D. and Walter H. Pierce), 362

Harris, Marshall, *Origin of the Land Tenure System in the United States* (Thompson, Layton S.), 356

Heady, Earl O. and Harold R. Jenson, *Farm Management Economics* (Hicks, John W.), 703

Huffman, Roy E., *Irrigation Development and Public Water Policy* (Kristjanson, B. H.), 165

Jones, Lawrence A. and David Durand, *Mortgage Lending Experience in Agriculture* (Baughman, Ernest T.), 724

Johnson, V. Webster and Raleigh Barlowe, *Land Problems and Policies* (Wilson, M. L.), 348

Johnston, Bruce F. and Mosaburo Hosoda and Yoshio Kusumi, *Japanese Food Management in World War II* (Goodwin, Dorothy C.), 181

Knapp, Joseph G., *E. A. Stokdyk—Architect of Cooperation* (Hedlund, G. W.), 168

Knight, Sir Henry, *Food Administration in India, 1939-47* (Sen, S. R.), 721

Koenig, Nathan, *A Comprehensive Agricultural Program for Puerto Rico* (Holton, Richard H.), 172

Kuchman, Carl, *California Administrative Law and Procedure* (Mehren, George L.), 554

Leopold, Luna B. and Thomas Maddock, Jr., *The Flood Control Controversy, Big Dams, Little Dams and Land Management* (Lee, J. Karl), 704

Loomis, Charles P. and J. Allan Beegle, *Rural Social Systems and Adult Education* (Boyd, Virlyn A.), 726

Malenbaum, Wilfred, *The World Wheat Economy, 1885 to 1939* (Pine, Wilfred H.), 166
Medici, Giuseppe, *Principles of Appraisal* (Brooker, Marvin A.), 544
Murray, William G., *Agricultural Finance* (Wall, Norman J.), 548

Nourse, Edwin G., *Economics in the Public Service—Administrative Aspects of the Employment Act* (Knapp, Joseph G.), 353

Range, Willard, *A Century of Georgia Agriculture, 1850-1950* (Butler, Charles P.), 709
Research Staff of the Free Europe Press, *Satellite Agriculture in Crisis* (Meissner, Frank), 719

Schickele, Rainer, *Agricultural Policy* (Norton, L. J.), 343
Schultz, William F., Jr., *Conservation Law and Administration, A Case Study of Law and Resource Use in Pennsylvania* (Ackerman, Joseph), 358
Spencer, Leland and Stewart Johnson, *Milk Distribution and Pricing in Great Britain* (Currie, J. R.), 549

Taylor, Carl C., *The Farmers' Movement, 1620-1920* (Fuller, Varden), 179
Thirumalai, S., *Post-War Agricultural Problems and Policies in India* (Spielman, Henry W.), 714

Unesco, edited by Margaret Mead, *Cultural Patterns and Technical Change* Meissner, Frank), 555

Waugh, Frederick V., *Readings on Agricultural Marketing* (Kramer, Robert C.), 346
Wold, Herman and Lars Jureen, *Demand Analysis, A Study in Econometrics* (Hildreth, Clifford), 539
Woytinsky, W. S. and E. S., *World Population and Production* (Kantner, John F.), 712

Yohe, Ralph S., *What Our Farmers Can Learn From Other Lands* (Hollands, Harold F.), 175

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To recognize and encourage meritorious research the American Farm Economics Association made seven awards in 1954: one of $100 for the best article appearing in the JOURNAL OF FARM ECONOMICS during 1953; three of $250 each for the best research reports published during 1953; and three of $250 each for the best theses submitted during 1953 in partial fulfillment of requirements for Doctor of Philosophy degrees. The recipients of these awards were:

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Outstanding Ph.D. Theses

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Benjamin C. French	"Economic Efficiency in California Pear Packing Plants"
Vernon L. Sorenson	"A Study of the Nature and Cost of Government Programs Affecting Potatoes and Their Impact on Inter-Market Relationships"

Outstanding Published Research Reports

Karl A. Fox	"A Spatial Equilibrium Model of the Livestock-Feed Economy in the United States"
D. Gale Johnson	"Comparability of Labor Capacities of Farm and Nonfarm Labor"
Kenneth W. Meinken	"The Demand and Price Situation for Oats, Barley and Sorghum Grains"

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